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COMPUTER

JULY 1985

BRITAIN'S BIGGEST-SELLING HOME COMPUTER MAGAZINE

Vol. 5 No. 7

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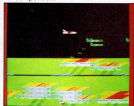
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"NEVER DID TRUST THAT SINCLAIR"

THE SINCLAIR CYNICS have turned full circle. They sneered at his first sub-£100 ZX-80 five years ago, and now they're back rubbing their hands in glee at the first major financial crisis to face him in five years' home computing.

Between the early black box days and the blacker months of early 1985 they jostled to talk to him and listened avidly to his Cromwellian views on *Question Time*. Now they seem to have conveniently forgotten that it was Sinclair who turned the U.K. into the most sophisticated computer market in Europe.

Of course the delayed-delivery and reliability problems that have beset all his machines have left a mark in people's minds, but his achievement in giving Britain more computers per capita than any other country mustn't be played down.

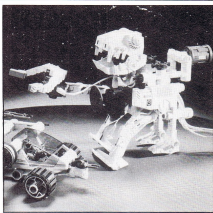
The disasters that have hit other home computer companies — Acorn, Oric and Dragon — have made his search for £10 million to £15 million for "financial reconstruction" particularly difficult; and the C-5 electric bidet hasn't done much to help. Despite the politicians' and the City's often confessed undying love for new technology, they run a mile when faced with the real thing. They'd rather invest in cabbages than computers.

Behind Sinclair's cash crisis lie many reasons, some common to all computer manufacturers, others unforceable. Christmas was bad everyone agrees, but nobody thought it was as bad as the £30 million of unsold Sinclair stocks seem to show.

The main obstacle between Sinclair and a flow of new funds is the understandable fear that he has become a one-product company — the Spectrum. And many believe that even that machine is well past its money-making heyday as it celebrates its third birthday in a quiet summer.

Sinclair's hopes are pinned on summer pocket TV sales balancing up the computer market's lopsided Christmas booms. He still believes the QL will make its long-awaited impact — he's planning to give a September release to a half megabyte wafer-scale technology disc drive for it.

Apart from red faces in the highest places in the land, Sinclair's difficulties may at least show that new technology is perhaps not such an easy solution for rebuilding the nation's wealth.



"Take me to your teacher."

CHALKIE ROBOTIX

ACTION MAN lookalike Gaxon Graves is teaching Welsh 10-year-olds Logo with the help of his control vehicle Robotix.

Robotix is a £60 construction kit including four motors, five channel control and 100 parts which kids can use to construct 10 different vehicles and robot arms. In America, where Milton Bradley has been selling Robotix

for a year, it is already available with an Apple interface and software. Now David Wharry of the Micro Electronics Programme and Patrick Drewett, a teacher at Coed Eva Junior School, Cwmbran, are experimenting with Robotix kits linked through a Deltronics controller to BBCs to teach the principles of problem solving, control and technology.

MSeXtra res

PRIVATELY MSX computer makers are showing off the new extended specification MSX-E micros with 512x192 resolution, 80-column text display, 256 colours and nine-voice sound which will go on sale in Japan this autumn. Publicly in Britain the likes of Sony, Toshiba and Mitsubishi insist that they will be selling only the existing under-specified over-priced MSX machines until after Christmas.

Toshiba, which has sold more MSXs than anyone else in Britain, unveiled its MSX-E, HX-23 and HX-22 micros at the consumer electronics trade shows in London last month. The 23 has 80K of video Ram and can inter-

face to a video disc player. JVC also showed their current MSX hooked up to a video disc running a demonstration golf game. As promised at the MSX launch, MSX-E retains upwards compatibility — it will run all existing MSX software — although, of course, new programs written to take advantage of the expanded MSX-E graphics and sound capabilities will not be downwards compatible.

In Japan MSX-E machines will start at around £350 — although some will include a built-in disc controller. Others may go further — Spectravideo is building in a complete disc drive.

Editor: TONY WOLFE, Assistant Editor: NICHOLAS JONES, Production Editor: IAN VALLIS, Software Editor: SIMON DEELEY, Commercial Software Editor: PAUL BOND, Editorial Assistant: LISA PADDON, Editorial Secretary: LYNN DAWSON, Editorial: 01-662 5444, Advertisement Manager: NICK KATNIERS (01-661 3137), Assistant Advertisement Manager: KEN WALFORD (01-661 3138), Senior Sales Executive: CELINE RIDLAKE (01-661 3456), Advertisement Executive: KAY FILLION (01-661 3456), Northern Office: GEOFF PARKER (01-872 8841), Advertisement Secretary: MAXINE OLLI, Classifieds: SUZAN PLATT (01-661 3036), Publisher: GUY DE WIT (01-661 3138), Group Advertisement Manager: SIOBHAN LAGAN, Your Computer, Room 1221, Quadrant House, The Quadrant, Station Square S20 2AS. © Business Press International Ltd 1985. Printed in Great Britain for the proprietors Business Press International Ltd, Quadrant House, The Quadrant, Station Square S20 2AS. Tel: 01-661 3160, Telexgrams: 980808 BPPRGG GBXN 028-0085. Printed by Riverside Press Ltd, Whitstable, Kent, and typeset by Binky Ltd, London EC1. Subscriptions: U.K. £24 for 12 issues, A£ 131, 50p July-December, 1985.

EUREKA FOR ORIC

Normans conquer Atmos

EUREKA INFORMATIQUE, which distributes British computers in France, has bought Oric for several hundred thousand pounds and will move production of Atmoses to its computer peripheral plant in Normandy later this month.

Oric, which announced its Spectrum-bashing 16 and 48K Oric 1 at the end of 1982 suffered financial crises and uncertainty which prevented it from competing successfully with Sinclair in Britain, although as Jean-Claude Talar, Eureka President points out it "enjoyed a good reputation in France".

Earlier this year Oric had to finally call in the receiver who has sold all rights to Oric's future plans for home micros including the Stratos and a 68000 based machine, as well as substantial stocks of components, half-built, and completed Atmoses to Eureka. Oric's other assets, including chip designs for an ultra low-cost IBM compatible will be sold elsewhere. Initially Eureka intends to assemble Oric's in Normandy, until the stockpile of



Stillborn Stratos.

components runs out, and sell them in France.

In August or September, Eureka will decide whether to go ahead with Stratos, a 64/128K micro with a built-in disc interface and perhaps modem, and whether

to go back into the British market.

British Oric owners lost their warranties when the company crashed but Eureka will be announcing details of a new support service for software, repairs and peripherals next.

Atari 520 not out CPC 128 declared

YORKIE MAN Alan Sugar sold us a dummy last month when he launched his disc-based CPC 664 without the extra Ram we'd predicted. But now the Amstrad 128 has appeared — in Chicago at the Consumer Electronics Show.

Enterprise, meanwhile, has named the price for its 128K micro which has 113K user memory and is 30 percent faster than, yet compatible with, its 64K cousin. Companies like U.S. Gold, Ocean, and Domark with its new James Bond game, are now writing Enterprise versions. The 128K micro will cost £250 while the 64 drops to £180 — that for a machine with 672x512 resolution.

Down in Slough, Atari's first batch of STs — only 520 of them oddly enough — are now with software houses and the like. First consumer deliveries should be through. Atari loyalists Silica shop in Sidcup.

WE'RE ALL GOING ON A CBM HOLIDAY

COMMODORE ENGINEERS from Britain and Europe flown to California to see the Amiga are impressed with the graphics. CBM's new 68000-based micro will hit the U.K. in 1986 and its £1,200 price includes a 3.5in Sony disc drive and a two-button mouse.

But the graphics chips will appear in future Commodore home computers. Resolution is better than TV quality — up to 1024x800, and 4096 colours all available through a GEM-like operating system. You can have five windows on screen with 16 colours in each. Amiga also has a built-in synthesiser to sound the battle cry against Tramiel's "Saints".

Commodore is also offering free trips to anyone who will take a CBM-64 off their hands this



Chicago price tag for 128 was \$300.

summer. For £199 you will get a 64, C2N Data Recorder, a brilliant game — International Soccer — and three days free accommodation at one of 250 hotels in Britain and Europe. A Commodore front man was able

to reassure the unduly cynical that you would have some choice "the hotels are not all in Sutton or Albania". The Plus 4 is being packaged with a 1541 disc drive, MPS 801 printer and Inpec business software for £450.

Remember Harold in 1066 Maggie

NOW THAT Halley's Comet is almost within range for amateur astronomers, Eclipse Software's £7 prediction program for the Spectrum can show you where in the sky to find it — for any time, date and latitude — important because many comet watchers may flee south to Australia for the best view of the giant snowball as it becomes visible to the naked eye late this year and early in 1986.

Gooch out for 64

ENGLAND V AUSTRALIA without having to worry about the mortal remains of Lord Darnley's stump. Gooch's Cricket, £10 from Audigenic, puts batsmen and bowlers alike at the mercy of your joystick.

DIARY

IF YOU ARE privileged enough to walk around Acorn's corridors of power and hear a cry of Alex Uboldi, it is probably not a comment about worried looking Chairman Alex Reid's rapidly thinning hair. Alex has much to worry about, what with the share price at an all time low of 9p, rumours of disaffection from Chris Curry, and PR firm Quentin Bell ditching Acorn because the company had so little to publicise. Olivetti has now put in an Italian, Alex Uboldi, as Managing Director of Acorn.

TRAMIEL still managed to surprise Chicago by launching the 260ST after all, at the Consumer Electronics Show. 256K Ram with a built-in 500K Sony drive and a black and white monitor will cost \$500.

STILL AT CES, rival British software houses seen dragging bags full of cash around as they try to gazump each other bidding for U.S. blockbusters. Wary of disappearing British companies, the Americans are demanding, and getting, six-figure royalties for their games with up to \$50,000 up front.

SOMEONE AT ULTRATEC has just discovered rude words and for some reason has decided to fill the loader program of the AMSDISK tape to disc utility which they sell, with abuse.

We heard about it from J. Shaw, whose 11-year-old daughter was given Amsdisk on her birthday. She called him in after listing 70 lines of abuse which include the line "I've left Basic unprotected to let people see these f***ing comments". Now Shaw, who tells us that his occupation allows him "access to computer files" and that he has "given the tape to my superiors for a decision to be made regarding prosecuting" has sent a copy of the offending lines to the Trading Standards Office.

We cannot guarantee that anyone who sends money to Ultratec will now be sent anything in return while an investigation is carried out into the legality of sending obscene listings through the post.

Elsie Dee

DON'T TOUCH

Software industry at risk

"DON'T TOUCH" is the advice Tim Langdell of the Guild of Software Houses is giving to anyone tempted to use Evesham Micros Interface III to copy software tapes. One touch of the button once you have loaded the program and the Interface III dumps the whole contents of a Spectrum's memory onto micro-drive, evading all the protection devices so far developed for commercial software.

Evesham advertises the unit for making back-up tapes but Roger Tuckett of the Federation against Software Theft points out that the William Powell Computer Copyright Bill should become law this month and then making back-ups other than for research and private study — which is narrowly defined — will be a breach of copyright. Selling copies is punishable by fines and imprisonment. Tuckett condemns "companies like Evesham Micros which sell machines under the guise of making back-ups."

Langdell does not believe that there is any such thing as an innocent copy. "I have never found the need for a back-up — you have to do something extreme to a tape, like dropping it near a magnet or letting the dog chew it." If a program does not load as easily on the 1,000th occasion as it did on the first, GOSH believes



A crime is about to be committed.

that the software house should replace it.

Up until Interface III, better software protection had made it more difficult to break into

programs while speed loaders had reduced tape to tape copying. A new wave of piracy could be the last straw for ailing software houses.

PLUS, TV AND PRINTER £200



Sinclair tries to wake up Spectrum sales.

SINCLAIR IS BUNDLING up a Spectrum, flat screen TV, ZX Printer and software including Vu 3D, Chess and four other games for £199 in a summer offer through Dixons. Although you cannot use the £100 miniature

screen with your micro — it has no serial socket — Sinclair's reasoning is that a go-anywhere TV is the sort of product that will appeal in the summer when computer sales are otherwise at their lowest.

Brussels spurs cards

IN THE WAKE of the Brussels European Cup soccer disaster, football clubs are starting to take Sperry's idea for providing computer identity cards for fans to curb hooliganism seriously. Chelsea is signing up and Stockport, Bournemouth and Reading, amongst others are considering similar systems. Although the scheme has been written off as unworkable by Ted Croker of the FA and Chief Constable Anderson of Manchester, small First Division clubs like Luton and Oxford which plan to ban all away fans from league matches might find the Sperry Systemsolve plan effective.

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POP★ TOPS

TOP 20

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3	Bohnd	Empeia	Sp
4	Wild Banck	Firebird	Sp
5	Shadow Fire	Beyond	Sp
6	Brian Jacks Challenge	Mattech	Sp
7	Grand National	Elite	Sp
8	Dragon Torc	Hewson Consultants	Sp
9	Gyren	Firebird	Sp
10	Everybody's a Wally	Microgen	Sp
11	Malin Day	Ocean	Sp
12	Amhem	CCS	Sp
13	Starstrike	Realtime	Sp
14	Gemsins	Adv Inter-national	Sp
15	Death Star Interceptor	System 3	Sp
16	Minder	D.K. Tronics	Sp
17	Jonah	New Generation Software	Sp
18	Overdrive	Superior Software	Sp
19	Bumper Bunde	Aligata	Sp
20	Alien 8	Ultimate	Sp

Sp = Spectrum, Bc = BBC, At = Atari, 16 = CSM 16, El = Electron, Source = WH Smith.

TOP 3 BY MACHINE

1	R.I.P.	N. Tronic	Vc
2	Rockman	N. Tronic	Vc
3	Blackman	Firebird	Vc
1	Basketball	CBM	64
2	Gates of Dawn	Virgin	64
3	Callier	N. Tronic	64
1	Starion	Mel House	Sp
2	Boaty	Firebird	Sp
3	Brace Lee	US Gold	Sp
1	Football Manager	Additive	El
2	Wizards	Imagine	Bc
3	Giz	Acornsoft	Bc
1	Brace Lee	US Gold	At
2	Splitfire Ace	Atari	At
3	Fort	US Gold	At
1	Apocalypse		
2	BMX Racers	M. Tronic	16
3	Excit	CBM	16
1	Wizards	Mel House	16
2	The Princess		
1	Deadrive	Superior Soft	El
2	Elite	Acornsoft	El
3	Football Manager	Additive	El
1	Ghostbusters	Activision	Am
2	Combat Lynx	Daniel	Am
3	Defaction	Ocean	Am
1	Ghostbusters	Activision	Ms
2	Clay Golf	Mel Micro	Ms
3	Jet Set Willy	S. Projects	Ms

Vc = Vc 20, 64 = CSM 64, Sp = Spectrum, Bc = BBC, At = Atari, 16 = CSM 16, El = Electron, Am = Amstrad, Ms = MSX, Source = Websters Software.

MAXAM IS VINDICATED

MAY I reply to Nick Godwin's attack on our products printed in June's Letters Page.

Our policy is simple. We find it morally unacceptable to market software knowing that it does not perform to the advertised specification. We are grateful to any customer who can substantiate their claim that a program contains a bug. In such instances, or where tape duplication is faulty, we replace it without quibble. As features have been added to MAXAM upgrades have been offered to old customers.

Now to Mr. Godwin's two-pronged attack. He wrote to us in March praising the product and with a request to 'borrow' a Rom version, after mentioning a couple of mythical bugs. These bugs do not and have never existed - even in the earliest production copies. Bugs as serious as these reported by Mr. Godwin would have been spotted months ago by the 5 in-depth magazine reviewers, the dozens or more leading software houses and the 300 plus owners of the various versions of MAXAM!

His second, rather more invidious attack on my marketing strategy, together with his pontificating on the merits of a Rom-based utility at all, shows an alarming degree of general ignorance for a man in charge of a user-club newsletter! Our marketing strategy is based on factual information, and in support I can refer you to the June edition of *Amstrad Computer User*, containing a detailed article written by someone rather more clued in than Mr. Godwin.

David Fisk,
Amor Limited,
London SE25.

Editorial comment: We find David Fisk's reply wholly convincing. A number of readers have confirmed that Amor's cassette-based assembler is bug-free, and, indeed, an excellent program. As for the Maxam Rom we stand by the judgement of our May review that 'this looks like a product no serious Amstrad user can afford to be without.'

SLOPPY PROGRAMS

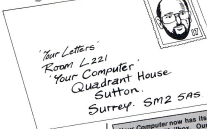
I REALLY CAN'T let you get away with your article in May's First Bytes, entitled *Elegant Programming*. I cannot fault the third or the first program - in either version - but two out of six is not enough for programs of this size.

The first thing that a beginner must learn about loops is that you should not jump out of them. Some Basics are more tolerant of this than others, and with all of them it will be forgiven in a very short program, but it is surely something that any programmer must discipline himself to avoid. Program 2 gives the game away. Line 20 reads:

20 IF L = 7 THEN ?"SEVEN":
L = 10:GOTO40

The whole point is that by making L = 10 you do not need the Goto. The

YOUR Letters



program will leave the loop naturally - and more quickly. In program 5 IF DS = "ORANGES" THEN? should be changed to:

THEN L=5

for the same reason. Program 4 has no semicolon between "Countdown" and CD. I am aware that you don't need one on the Apple, but most computers would crash here.

Program 6 is more spectacular with two jumps out of a loop, an error in line 50 that would produce the opposite statement to that required if it ever got there. On most computers it is unlikely to do so, as the Msd's will have to read beyond the end of the string. Line 30 should be:

FOR L = 1 TO LEN(A\$) - 2
and line 50 should start
IF L = LEN(A\$) - 2

if we must do it that way. Better to omit line 50 and add 65
?"NO MATCH":END

I took Program 1 to heart. I am sloppy. Whether you put Next or Next D is a matter of style. The former saves space and is quicker, the latter

is more readable. I did not think one was wrong and the other right. But I have taken the message to heart, and decided that I would rather be sloppy than elegant.
Goeffrey Childs,
Wykehouse,
Gloucestershire.

SPECTRUM TIPS

SPECTRUM owners may like to use some of my routines.

POKE 23659,0 makes the Spectrum crash if anything is printed in bottom part of the screen, e.g. error messages or breaks. (To disable this routine use Poke 23659,2)

PRINT USR 0 Completely clears the memory. (New only clears the Basic)

(continued on page 19)

'AMSTRAD CPC 664 IS OK'

MAY I be so bold as to suggest that Mr Lee-Paddon takes a driving lesson or two before he tries to rev up another computer.

I noticed in the review he did of the Amstrad CPC-664 several unfortunate mistakes. These errors could I suppose influence potential purchasers of this fine machine into looking elsewhere.

For a start the 3in. discs have when formatted for a CPM system disc 169k, or as a Data disc i.e. no CPM 178k or in IBM format 154k. Additional to the free space is a 2k directory on each side. A renumber command is included in the Basic.

With regard to the 'Warm Reset', what point is there in a warm reset if you have very good On Break Gosub protection. And if one were to read the manual it details how to define a function key to reset the mode and colours etc.

All in all I suppose it was a reasonable review but for the fact of the above errors.

S. Potter,
Brinsley,
Nottinghamshire.

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YCF/7

IN★ TOUCH

How to write for Your Computer

We called this magazine *Your Computer* precisely because we welcome your views, tips and hints and even your criticisms of machines and software in general. Here's how you go about getting your name into print. Your article should be typed, double-spaced, on A4 paper. A name and address on each sheet would help. Don't forget to tell us which machine it runs on. With programs please include a cassette or disc and some indication of how long it is. Please put what machine it's for on the envelope. Don't forget full instructions to us how to load and list your program and how to enter it for the readers.

The article must be submitted exclusively to *Your Computer*. We pay £35 per published page — that's as it appears in the magazine and includes illustrations.

Telsoft

Telsoft is *Your Computer's* software downloading service. Any program for the Spectrum or the BBC — and soon the Commodore — which has a telephone symbol next to it is available on the service. Both 1200 and 300 baud speeds are catered for. For more details call Colchester (0206) 8068. No more lonely nights typing in endless pages of hex digits.

Message service

You can get messages to us in two ways. Either use the Prestel Telex Link to 892084 BISPREG or you can use our very own modem, day or night on 01-661 8978. The modem is V21, 300 baud, even parity, 10 bits per character. You simply transmit in upper case "YRC" — our address code, and wait for the acceptance code + + + STF GO". Then off you go. Don't forget to tell us who it's for. Sign off with "NNNN" — again in upper case.

(continued from page 17)

9000 FOR I=1 TO LEN A\$PRINT
A\$(I:BEep .05;NEXt I:RETURN
prints text newflash style. It is meant
to be used as a sub routine. To activate
use LET A\$="message to be
printed.", then set the printing
variables. For example:
PRINT AT x,y;

and

GOSUB 9000

I have noticed that the Spectrum has
a facility to convert binary numbers
to decimal but it doesn't have anything
to convert decimal numbers to binary,
so I have written a routine to serve this
purpose. Poke the decimal number
that you want to convert into location
16384, then run this routine:

```
1 LET A$=""
2 FOR I=0 TO 7:LET
A$=A$+STR$(POINT(I,175);NEXt I:PRINT A$:STOP
```

Neil Braggins,
Narbera,
Acon.

SPRITES BUG

I HAVE just discovered a bug in the
listing for my Sprite Basic article in
the June issue which prevents the two
commands Break On and Break Off
from operating correctly. However,
the bug can simply be cured by
loading the machine code, and then
running this program:

```
10 FOR J=62780 TO 62850 STEP
-1
20 POKE J+21:PEEK J:NEXt J
30 FOR J=62850 TO 62780
40 READ N:POKE J,N:NEXt J
50 DATA 7,98,114,101,97,107,115,
110,166,237
60 DATA 8,98,114,101,97,107,115,
102,102,175,237
70 POKE 60198,208
80 SAVE "SPRASCODE" CODE
90000,2800
```

Robert Newman,
Oxford,
Peterborough.

HACKERS BAD

THE INTRUSION of electronic shoplifters
— hackers — in your May Leader was
quite touching, implying that all they
are interested in is helping big business
to tighten up the security of its

YOUR Letter

computer systems.

If an intruder was apprehended in
your office in front of your safe, which
he had just opened, and he claimed
that he was not really interested in the
contents at all, but that all he was
trying to do was to demonstrate to you
that your security was lax, would you
really just thank him kindly and send
him on his way, perhaps with a reward
for the kindness he had done you?

I think the naivety of your leader
writer is surprised only by that of the
author of the *Hacker's Handbook* if he
really believes what he wrote in the
quotation you give from his book on
page 49.

I. Howard Wright,
Saatchi,
Clackmannanshire.

SNAKES ALIVE TIP

THANK YOU for publishing my
corrections for the game *Snakes Alive!*
last month. I am pleased to say that
it is now emulable, and should work
straight away.

For those that are still having
problems though, a couple of large
checkmarks might help locate the
source of your error. These are 417
851 for listing 3 and 377 062 for listing
2. Just write a loop to add up all the
contents from 28384 to 32767
inclusive, and these two numbers
should be returned for their respective
listings.

For those that have successfully
typed in all the code, congratulations!

If you are having problems guiding
the snake around all 48 locations, here
are a couple of "cheating" Pokes that

should (only for a while!) make things
easier:

POKE 25803, any number from 1
to 256 (poked as 0). This is the
initial SPEED value. Note that it is
actually a two byte variable, and
large values will be very slow —
avoid them! The first byte, at
25802 should only be POKEd with
caution — it must always be a
multiple of four. Normal value for
the second byte is seven.

POKE 25797, any number correspond-
ing to a character from 149 (49-57). This is the initial number
of LIVES.

These POKES should be typed
after loading in the finalised code.

These should make things easier for
those weak souled people who can't
stand the challenge. (Or those like me
that just aren't fast enough!)

To cater for those who have bought
cassettes off me, the same two effects
are achieved by holding down keys D
and A while the last block of the
normal load version loads. You will
then be prompted.

D.R. Aspinall,
Bromwood,
Essex.

BITS 'N' BOBS

Line 2510 in June's *Amstrad* program,
Engelbert, is unclear. The last
statement should read:
PRINT "44 deg°".

The Spectrum and CBM 64 listings
in June's Top Tips managed to get
themselves mixed up. And on top of
this D. Rockley's listing — for the
Spectrum — contains an error in line
90. The USR should read
\$4721, not \$4271.

Lastly, line 65480, Listing 2 of
June's Spectrum program *Wizard's
Dex*, reads:

```
65800: 09C0424242423C00 = 384
```

ARE WE UNDERMINING THE ORGANISATION?

MAY I, as a headmaster of a large
comprehensive school whose
library accepts your magazine
Your Computer, complain in the

strongest possible way about the
June edition.



Bottom left hand corner you claim
no responsibility for what you
print, you make two comments
which are obviously aimed to
undermine the organisation of
both schools and examination
boards:

(i) "... which might help you
break into the computers that
store examination records".
(ii) "when you send your idea,
... for cheating in an exam or
pulling off a scam ...".

We feel very strongly at this
school that your magazine should
not be allowed to be on display in
our library if such comments are
to be repeated in future editions.

J.W. Barrett,
The Lindsey School,
Cleethorpe.

Scaling new peaks

PEEK AND POKE are — like Barke and Hare or Heffer and Skinner — names guaranteed to strike terror into the hearts of most God-fearing folk and certainly all novice programmers.

After all, when you've only just got the hang of making your screen display look something like the way you meant, after hours of juggling Print and Tab statements and a contagion of semi-colons, it's hardly surprising that you'd rather leave the mysteries of memory addresses alone.

But you'll have to tackle PEEK and POKE some day, and there's no better way to start than by experimenting with the chunk of memory that controls your micro's screen display.

First, let's remind ourselves what the statements PEEK and POKE really mean. Although every micro has a total memory expressed as 16K — that is, 16,000 bytes — 32K, 64K or whatever, some of that memory is gobbled up by the computer's operating system — including the Basic that makes it easy to write programs — so that in the Commodore 64, for example, just over 30K of Ram is left for your own Basic use.

Check out your micro's manual and you should be able to discover what chunk of Ram is *allocated* up by the screen — and, possibly, colour — memory. The 64, for instance, offers a screen display "crossword" of 40 characters across and 25 down — a total of 1000 squares. Each square needs a byte to itself, and so its screen memory occupies the 1000 addresses from 1024 to 2023. Unlike some micros, the 64 needs a separate colour memory for each of those 1000 squares, and this squats at addresses 52296 to 56295. In the Commodore 16 and Plus4 screen and colour memory runs from 3072 to 4071 and 2048 to 3047 respectively. The Spectrum QL screen uses addresses 131072 to 163839, and the Amstrad CPC-464's screen memory occupies 49152 to 65535.

In the demos and program which follow, we'll cut down on finger fatigue by first declaring a variable equal to the first screen/colour memory address. For the Commodore 64, you'd need a line like this:

```
10 SM = 1024:CM = 52296
```

You can think of a block of addresses as a huge rack of cubby holes, such as you might see in a mail sorting office; all have glass doors so that you can see — or PEEK — what is inside — but only some of them can be opened so that you may Place — or POKE — something into an empty one, or replace the existing contents with something else.

That "something else" is a different value in the range 0 to 255. In the case of a POKE to screen memory, you'll be using a value chosen from the ASCII — pronounced *askey* — or machine-specific table of screen codes representing the usual alphanumeric keyboard set as well as the special graphic symbols available on some micros.

Again, there should be a list of these in your manual; but be clear that



ASCII and screen codes are different again from the table of CHR\$ values for the same characters. ASCII screen codes commonly run from 0 to 127 — with the alphabet beginning at 1 — with screen codes 128 to 255 usually producing the same character set in reverse field form. Now add these lines:

```
20 FOR L = 0 TO 9
40 POKE SM + L
50 NEXT L
```

These lines, as you'll see when you Run them, will serve to POKE the letter A into the first 10 screen memory addresses. They all now hold, of course, the value 1. Prove it:

```
60 PRINT PRINT
70 FOR L = 0 TO 19
80 PRINT (PEEK(SM + L));
90 NEXT L
```

Run the whole program again, and after the As have appeared, the three new lines will cause the figure 1 to be

BEGINNERS

first bytes

printed the same number of times, and then you'll see 10 zeros. That's because the next 10 addresses in screen memory — in common with all the remainder — hold no value at all. Now alter line 40 to:

```
40 POKE SM + L, L
```

for a different result. Finally, enter in direct mode:

```
POKE SM + 5,22
```

and notice how this wipes the character held there, as a direct mode PRINT (PEEK(SM + L)) will confirm.

To introduce a little colour into the proceedings, set your prime variables in 10 line as before and then type:

```
20 FOR L = 1 to 10
```

```
30 POKE CM + L, L
```

```
40 POKE SM + L, L
```

```
50 NEXT L
```

Colour codes are usually separately numbered from 0 to 15 or higher, so line 30 simply prints out the first 10 characters in the first 10 colours available. Incidentally, it's better to POKE colour before screen memory, otherwise you'll often get an untidy double image as each character appears; swap lines 30 and 40 to see this effect.

Using Pokes, this next routine pro-

duces a quite mesmerising, ever-changing kaleidoscopic display of all the characters and colours your keyboard can generate. It's also ideal for automatically generating sleeve designs for the Eurythmics: Line 20 declares the correct variables for a Commodore 64.

SC should equal your micro's maximum number of character-producing ASCII screen codes, CC the number of colour codes available, SL the total screen locations, and NC the maximum number of characters to a line; alter these variables as necessary to the equivalents on your micro:

```
90 PRINT (CLEAR SCREEN)
20 SM = 1024:CM = 52296
SC = 255:CC = 15: SL = 1000:
NC = 40
30 F1 = INT(RND(1))*SC + 1
40 F2 = INT(RND(1))*10 + 1
50 F3 = INT(RND(1))*NC*20 + 1
60 F4 = INT(RND(1))*CG*1
70 FOR L = 1 TO SL STEP F3
80 POKE CM + F2 + L, F4
90 POKE SM + F2 + L, F1
100 NEXT L
110 GOTO 30
```

You'll find that the best effect is achieved by adding to line 10 your own micro's commands for setting the screen and border colour to white.

John Ransley.

Modems — the whys and wherefores

A MODEM is one of the most worthwhile add-ons you can have for your computer. And with prices starting now at just a few tens of pounds, it can also be one of the cheapest.

With a modem you can exchange software with friends over the phone, dial up commercial mega-databases such as Prodig or Knowledge Index, or explore the expanding network of privately-run computer bulletin boards.

"Modem" is simply a contraction of modulator-demodulator: it's a two-way converter which translates data in your computer into audible tones suitable for sending along a telephone line — and vice versa.

In the phone line, each bit is represented by a high or low tone, depending on whether it's a 0 or a 1. Since only one bit can be sent at a time, data must be offered to the modem in serial

form. So you can't plug in to an ordinary modem unless your computer has a serial port. However, for many popular computers you can get special interfaces or communications packs which take care of the problem.

Among the cheapest modems are the sort known as acoustic couplers. These have rubber cups into which you press your telephone handset when you hear the distant computer answer your call.

Unfortunately, acoustic couplers tend to pick up room noise, which can corrupt the data. So unless portability matters, you may prefer the more reliable direct-connect modem, which plugs into a standard telephone socket. If you haven't got these at home, British Telecom can fit them.

In choosing a modem, decide first which services you're interested in. Several different signalling standards

— or tone combinations — are in use; and you can either pick a modem to match or pay more to have a multi-standard modem.

Perhaps the commonest standard now is the vmodem format used by Prodig, which sends data to you at 1200 baud and expects your replies at 75 baud. The figures denote the speed of transmission: in this context, you can take them to mean bits per second.

Each byte you send has to be gift-wrapped with start and stop bits, making up 10 bits or so altogether. So even 75 baud works out a lot faster than you can type!

Some bulletin boards today accept 1200/75 tones, but more usual is the 300/300 baud standard — often referred to in technical jargon as V.21; the vmodem standard is V.23.

To use a modem, you need communications software. Its basic function is to re-route the data paths in your computer: characters from the keyboard must be diverted to the serial port, characters received from the modem must be sent to the screen.

Details of vmodem packages for a wide range of home and business micros are available from Micromet 800, Durrant House, 8 Herby Hall, London EC1R 5EJ, telephone 01-278 1343.

Richard Lambley.



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Pacesetters

Joystick interface
Spectrum
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Mid Valley Micro

Two joystick interfaces are available, one which uses the Kempston protocol, and, for ten pounds more, a software programmable interface. Both these devices incorporate the company's patented "slomo" slow motion device, which allows you to play game at any speed.

The Connection

Printer interface
Commodore
£79.95
Tymac

Rather on the steep side, this interface plugs into the serial port, and allows the Commodore to be interfaced with any parallel computer. Different versions are available to cope with the graphics commands of various printers. The company claims that the interface is compatible with all software that expects a Commodore printer to be connected. Tel 021 327 8637.

Tape care kit

Global software
Various
£8.95

Two parts to this kit, azimuth alignment and head cleaner/demagnetizer. The azimuth tape constantly monitors the number of errors detected while the tape is running, so alignment occurs when you get fewest errors. Cleaner is of the usual fabric type. A promising start from this new software company. Tel 01-228 6730.

Azimuth head alignment

Interceptor
Amstrad 464
£8.99

Following up their successful alignment tape for the C64, Interceptor are going for the Amstrad. An invaluable device, as so many "faulty" commercial tapes turn out to merely have alignment problems.

HARDWARE

but first

Dot Matrix Printers

■ Star
■ £259 upwards

SAY THE WORD "printer" to the average home computer user, and the chances are he'll think of Epson, for so long the dominant force in the printer market. With this new range of printers, Star hope to make some kind of inroad into this market.

The range consists of three dot matrix printers aimed at the home user; the SG10 at £259, the SD10 at £389 and the SG15 also at £389. They are either Epson or IBM compatible, and offer an attractive near letter quality font and a removable tractor unit. The DIP switches for selecting character sets etc. are easy to get at, usually on the left hand side, a major improvement over Epson's hiding them away inside. In the software, Star have come up with a neat idea, you can define a printer macro, once you define a series of often used commands, you can execute them by just sending the macro command. Perhaps this might have been more useful if several macros could have been defined. The SG and SD10 printers are both eighty columns with speeds of 120 and 160 cps respectively and 2k (just over half a page) buffers as standard, expandable to 8k. The SG15 is 136 columns, at



Star printers.

120 cps and has a 16k buffer as standard. The SD10 uses a ribbon cartridge, the SG's, typewriter style ribbons.

So how do they compare? Well, in use, they seem rugged and reliable. Noise levels were reasonable, the paper feed reliable and precise. The only

slight quibbles are that the paper guides are a bit clumsy and the paper tear off is a long way from the print head, which means after doing a form feed after printing your document, you've still got to move the paper by hand before tearing it off. Certainly anyone looking at a printer in this sort of price range should carefully consider this bunch.

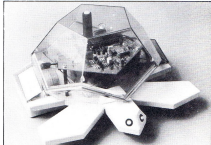
Valiant Turtle

■ Spectrum/BBG/CBM 64
■ Valiant Designs
■ £215 for home users, £201 for schools

THERE ARE at least half a dozen different makes of turtle on the market but Valiant Design's product has already established itself as a rather superior turtle. Primarily intended for use in schools, it has two features that make it especially attractive to children. First it looks more turtle-like than most of its competitors. As well as legs, a shell, and a head, it even has a pair of red LEDs for eyes.

Second, it is not hampered by wires and cables but can roam free under the remote control of an infra-red transmitter. This device connects to your micro by either a serial or parallel lead, and gives the turtle a range of up to six metres. Power is provided by nickel cadmium batteries.

On top of this the turtle appears to be both robust and accurate; sufficiently accurate in fact to double up as a simple plotter. Its main use, however, will be to create turtle graphics in conjunction with Logo. Although the turtle pack does not include Logo it supports most versions of the language currently available. For more details ring Valiant Designs Ltd, 01 720 3947/627 1351.



Valiant turtle.

Interface III

■ Spectrum
■ Evesham Micro
■ £39.95

IT HAD TO COME, the ultimate copier against which there seems little possibility of protection. But of course, you would only use it for copying your own software to Microdrive wouldn't you?

Hardly elegant, this unit uses the sledgehammer approach to cracking the nut of software protection. After

you have loaded in the game, you simply hit a button on the unit, which plugs into the back of the Spectrum, and it simply dumps the entire contents of Ram onto the cassette port.

It also gives you the option of loading the screen display (important if machine code has been hidden in the screen area). Skipping this will mean that the program will take up about 5 sectors, so you can get two games onto one cartridge. The obvious disadvantage is that no matter how short the program is it will take up about the same amount of space.



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Star★ chart

On-Court Tennis

IBM-64
Activision
Tennis simulation
£10.99
★★★★

Good quality simulation — as with the quarter backs in this company's football game, the tennis players have individual personalities, so Ivan Messier has a great serve and plenty of endurance, but Jimmy Orr sometimes wears a bit thin.

Didn't actually throw his racket at anyone while I was playing. You can select surfaces to play on.

On-Field Football

IBM-64
Activision
US football simulation
£10.99
★★★★

At first glance this looks like a game of table football — same overhead view. But this game has all the jargon and complexity of the real thing, without the popcorn and the cheerleaders. You choose your starting quarterback, wide receiver, and tight end to fine tune your offensive strategy. You can even bring in substitutes. If you don't understand what all this means, then buy this game and catch up with Nicky Horne.

Quackshot

Spectrum
Creative Sparks
Arcade adventure
£2.95
★★★★

No prizes for innovation, but value for money at the Sparklers economy price. A Tutankhamnesque maze game in which you, nightwatchman in the Acme Clockwork Toy Factory, are confronted by rampaging clockwork ducks. Armed with duckbuster bombs and stung gun you must fight them and the green snakes off. As with Tutankhamun you have to collect keys to move between levels.

SOFTWARE

The Artist

■ Spectrum
■ Softtek
■ Graphics utility
■ £12.95
★★★★

SELL YOUR Macintosh. That's what ex-Volvo assembly line worker turned full-time programmer Bo Langeberg suggests people will be able to do once they've loaded his new program into a Spectrum.

There are even plans afoot to market this program with a mouse for the Spectrum. But at the moment you have to get by with five fingers to move the cursor. When the program has loaded you are confronted with an empty screen and two flashing cursors, one square, one cross-shaped.

You can get straight into some sort of Mac type painting by selecting a paint-brush and a brush pattern. At the base of the screen you have a choice of eight special commands — apart from brush and brush pattern these include a text option, a view command which shows you the whole screen without the commands, a move option which enables you to raise the screen so you can work on the base of the picture but still see the commands, a clear-screen option, a storage and a character creation option.

The reason you need five fingers is that apart from the directional controls of the brush you need to keep your thumb on the C key which sets the pixels on the screen.

By pressing the symbol shift key you can move between two sets of other commands, pixel setting commands and colour setting commands. The pixel command section has some very powerful commands. You can enlarge



The Artist.



Entombed.

sections of the screen. You have instantaneous box and circle commands.

This section also has an overlay command which is comparable to placing a plastic sheet on top of a picture and copying it.

The colour commands open up a window around the cursor and the cross. Inside it ink, paper brightness and flash can be set separately. Paul Bond

Elidon

■ IBM-64
■ Daphneus
■ Arcade adventure
■ £7.99
★★★★

PLENTY of whimsy in the software market this month. We are treated to a trip to fairyland in Elidon. The beautiful graphics depict a hapless flower fairy as she tries to collect seven bottles of magic potion followed by pouring the bottles on to magic flowers in order to revive the magic garland to its former glory.

On her way she is hindered by tree-spirits, flames, strange bundles of energy and eerie darkened rooms peopled by things with glowing eyes. At first, a leaf, a crapple — any of these will help her ward off the unwelcome attentions of the evil spirits. There are also lucky horseshoes to be found for bonus points. But do not pick up the ones which are upside



Elidon.

down, for of course all the luck will have drained out of them and they will kill you.

It's possible to pick up a torch to guide the fairy through the darkened rooms and she needs all the help she can get for her VISTOL capability is easily upset by the slightest bump. It is possible to get her to hover by judicious use of the fire button.

There are also forcefields which can only be penetrated by the aid of a horn or a set of pan pipes.

And in this exciting Ultimateque game, your little fairy is going to need all the angel dust she can get.

Paul Bond

Entombed

■ C64
■ Ultimate
■ Arcade
■ £7.95
★★

THERE IS ALWAYS a buzz of expectation whenever a new Ultimate title comes along. With a string of hits like Knightmare, Underworld and Alien 8 under their belt, we've come to expect something rather special from them. Entombed is set in Egypt, where our intrepid explorer, Sir Arthur Pennington, is entombed beneath the Sphinx, searching for the scrolls which will help him get out of this tricky spot.

The screen display shows a Scarab on the wall's view of Sir Arthur wandering about the corridors. There are two varieties of screens, scrolling, maze-like corridors and rooms where the various objects of your quest lie. The walls of the corridors are nicely done, covered in hieroglyphics. Apart from the scrolls, there are two objects you collect of more immediate value, a whip and a torch.

The problem is, the whole thing is rather sterile and predictable. In the corridors, you are constantly being irritated by things materialising and attacking you as you try to map out the maze. The rooms are too small to pose an interesting challenge like Manic Miner and clones, and the solution is normally irritatingly trivial. Nothing constructive in the way of hidden clues is done with the hieroglyphics, the noises in the corridor are just plain irritating and time consuming.

A pity, but not really up to the high standards we have come to expect. This game was actually written by a bunch called ACS and marketed under the Ultimate label, they would do better to stick to the Spectrum and their in-house programmers.

Lee Padden

(continued on page 29)



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Star chart

Flip!

88C
Strategy word game
Icon
£7.95

J S Bach meets Ghostbusters; Mozart clashes with Teddybears' Picnic. In Icon's Palmanism-cum-word game, classical compositions mix with modern classics and classy graphics.

To score points you have to flip over the boxes to reveal matching pairs of graphics — Pac-Man, a Space Invader and a teddy bear to name but three of the 15-odd characters on the 4-by-10 grid.

As each box flips over you see the animated graphic and hear a snatch of its theme tune; find its partner and you hear the rest of the musical phrase. Behind the correctly paired boxes are fragments of letters which go together to spell a word. That's the second part of the game.

It's a race to identify the hidden word. But in the two-player game rash guesses made too early only give points to your opponent.

Ghettoblaster

CBM-64
Virgin
Arcade adventure
£8.95

Rockin' Rodney — no relation to Rankin' Rodney in Taskset's Jammin' — has to shop for batteries and search for a tape to put in his FBR (frantically big radio).

Then press F5 and you will hear the beat. The aim of the game is to successfully deliver 10 tapes to Intertune Records. Meantime he can press the firebutton and fire notes at people to make them listen up.

A good game with some humour — street names like Electric Avenue get in, as do hippy anomalies like the Doors' Moonlight Drive and Love Street. Bob Dylan gets most streets into this game.

(continued from page 27)

Charlie and the Chocolate Factory

■ Spectrum
■ Hill MacGibbon
■ Arcade adventure
■ £9.95

JUST IMAGINE that! A whole day inside an enormous chocolate factory! And not just any old enormous chocolate factory! No, it's Wonka's Factory, where they make marshmallows that taste of violets, and chewing gum that never loses its flavour.

This is the prize that Charlie Bucket wins when he finds a golden ticket in a Wonka's chocolate bar. And this is the plot of Roald Dahl's scrumptious book, *Charlie and the Chocolate Factory*. Now those lovely people at Hill MacGibbon have turned it into a yummy computer game.

The primary game is split into four sections based on the plight of individuals who fall foul of the Chocolate Factory in the best moralistic way. Augustus Gloop whose face is like a monstrous ball of dough with two tiny current eyes peering out, becomes a purple blob in one of the sweet machines. Depicted in a maze of pipelines on the Spectrum screen, you must move Charlie backwards and forwards at the base of the screen, twisting pipes until Augustus is safely decanted into a flask. Otherwise he emerges from an open pipe as a sticky cloud.

The next section has Violet Beauregarde irritated by bouncing blueberries. Basically a breakout-style format: you use keys 6, 7, 8 and 9 to move Violet around and get her shield to fend off the ferocious fruit. The idea is to bounce berries into a juicer, or else.

The fourth section confronts television addict Mike Teavee with TV cameras. Their deadly rays can only be counteracted by eating Wonka bars.

In the third section Veruca Salt has enraged the squirrels in the nut room. They want to chuck her out with all the other rubbish. She tries to leave poison nuts in their path, but these fade away quickly.

A nice touch is that you can practice each section without having to play the whole game, but if you rescue Charlie's companions in the primary game, then you will be given the code you need to help Charlie find the six gold keys in the chocolate factory.

And this leads you to a whole new game on the flip-side of the cassette. This would seem to be a game in the style of Manic Miner, with 43 challenging rooms to explore, in order that Charlie can enter the Great Glass Lift.

Paul Bond.

SOFTWARE

Shortlist



Charlie and the Chocolate Factory.



Jonah Barrington's Squash.

Jonah Barrington's Squash

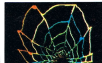
■ Spectrum
■ Simulation
■ New Generation Software
■ £7.95

JONAH BARRINGTON'S (he is a famous squash player) Squash can be played against another human, or against the computer.

There are four difficulty levels, just as there are four ball spot colours in squash, ranging from red (easy) to yellow (difficult). The screen display is split in two sections with a three-dimensional representation of the game on the left hand side of the screen.

Hitting the fire button makes your player do a forehand or a backhand stroke, depending on the position of the ball when the button is pressed. So by careful timing you can alter the angle at which the ball leaves the racket.

Paul Bond



Web Dimension.

Web Dimension

■ Commodore 64
■ Ecological game
■ £10.99

THE SCREEN DISPLAY shows a complex section of a web. Life-forms drift aimlessly about the web. Pressing the fire button you must move your sprite — a musical note — along the webways, being careful not to touch the glowing ones.

Using the music you can freeze the life-forms at the nodes of the web. Once they are all frozen, the second stage starts.

In this stage you must stabilise the creatures, which are in the form of constricting stars at the transitional phase. Then you see the next stage of evolution.

Paul Bond.

A View To A Kill

■ CBM-64
■ Arcade adventure
■ Domark
■ £10.99

THE GAME attempts to faithfully replicate three major action sequences from the movie.

The top half of the screen gives you a three-dimensional view of a Monster Maze of the streets. The lower half is an over head map view of Paris. A tracking bleeper indicate proximity of target.

Next, Bond's girlfriend who has the unlikely name of Stacy is trapped in a lift. Zarin has torched the building.

Essentially a platform game, the programmers have included a rather ingenious lockdown facility in the third stage.

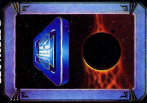
Paul Bond

(continued on page 31)

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COMMODORE 64



COMMODORE 64



48K SINCLAIR SPECTRUM



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Star★ chart

Beeline

BBC
Robico
£5.50
Maze game

★★★
Hank is a blue bee who explodes when he gets angry or tired. Your mission is to guide him to his beehive. Watch out for energy-sapping toadstools, spiders, faces, insecticide cans and the lizard's tongue.

Meanwhile, collect pollen grains, flowers, apples, honey pots and bowls of water.

Bulge

Spectrum/CBM-64
Lothlorien/ASP
£9.99
Wargame

★★★
After the bouquets last month for Anheim from CCS, it's time for the brickbats. To say that this is an improvement on Lothlorien's previous effort, Panzer Attack, would be true but would be no recommendation. It is in real time, and as the German commander, you simply haven't got time to issue all the orders you need to. As the game progresses and units get spread far and wide, you spend most of your time chasing round the map after errant units. Any bulge game which doesn't feature roads is doomed to failure.

Wetzone

BBC
Everiss Software
£6.95
Shoot 'em-up

★
An engaging little whimsy from the house set up by imagine renegade Bruce Everiss. Lots of different things to shoot at and every so often a UFO whizzes across the screen. If you hit it you score extra points. Sounds familiar? It did to us. We conclude that Bruce is re-examining his roots rather like Eric Clapton returning to the blues, or Working Week re-assessing jazz.

(continued from page 29)

Contraption

■ BBC
■ Platform
■ Icon Software
■ £8.95

★★★★
GAMES programmers — or designers as they now like to be called — sometimes complain that reviewers do not play their games long enough to do them justice. Helen and David Mann, the authors of Icon's Contraption, need have no such fears: between them *Your Computer's* games reviewers have racked up hours of playing time on this one. The game has inspired seasoned reviewers — veterans of scores of platform campaigns — to rise from their desks clamouring to be let at the keyboard.

As far as the plot is concerned the game is fairly conventional. You have to jump, bounce and scramble your way through 10 screens, picking up apples and avoiding such perils as floating bombs and toxic plants. But the course in each screen is particularly well constructed, and pitched at just about the right level of difficulty. At first sight it seems that you will never reach that vital ledge, or catch a lift from that floating coffee table. But once completed each screen is plain sailing the next time round.

However what really marks this platform game out as special is the superb use it makes of Mode 1 graphics. Adopting the Peak technique of outlining figures in black allows the designers to show all sorts of pleasingly inventive details which make most Mode 2 games look distinctly crude in comparison. Pipes actually look three-dimensional, bouncing valves gleam, and your little man is a real character ready — a herge holding old timer clad in red Mao jacket which admirably sets off his tuft of ginger hair.

Simon Beasley.

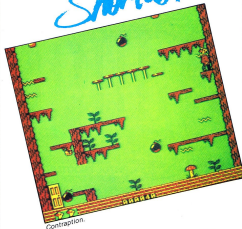
Combat Leader

■ CBM-64
■ Wargame
■ U.S. Gold
■ £9.95/£14.95

★★★★
COMPUTER wargames are big news in the states, andSSI are the big name. This offering from them, via U.S. Gold, puts you in command of a company of mixed tanks and infantry, against a similar force commanded by the computer. There are seven different scenarios available, giving you a range of objectives, or you can choose a roll-your-own option where you can pick the forces you and the computer will control and the objectives. This option also allows you to specify the characteristics the vehicles will have, and to help you, some historical data is provided to allow you to pit Sherman against Tigers, or even, if you have a taste for the bizarre, Matildas against Sheridans.

There are eight different mixes of terrain, most thickly wooded, with the

SOFTWARE Shortlist



odd hill. A river with a bridge might have been nice, but you can't have everything.

The game plays quite smoothly. You issue orders to units by a combination of keyboard and joystick. The unit's response is then displayed. Units report their position, and that of any enemy units they see.

The game seems rather weighted against the poor bloody infantry, whom you would expect to do pretty well in this sort of terrain. Despite being equipped with anti-tank weapons, they tend to come off second best.

Tactics are minimal, advance under cover until you find the enemy, then fire like mad until one of you is dead. However, interest is maintained by the wide variety of missions you can try and you can have different mixes of forces, and different types.

Certainly a lot less trouble than setting up a miniatures game.

A good first attempt in a difficult field where everybody has their own theory about what constitutes "realism" and historical accuracy. Lee Paddon.

Chopper

■ Creative Sparks
■ CBM-64
■ Scramble-type
■ £2.50

★★★★

WORTH every penny of (£2.50) this is another example of the Sparklers philosophy: "If you can't beat 'em, undercut 'em".

Instead of a spacecraft you fly a helicopter against oncoming hordes of hostile rotocraft. The angry buzzing of a massed helicopter squadron is faithfully replicated by the 64 and is guaranteed to make the neighbours think you are shooting the sequel to *Apocalypse Now* in your living room. The drawback is that you are fixed to the right hand side of the screen and can only move up and down. You can't shoot when you're moving and vice versa.

On the second screen, which you achieve after a tricky refuelling sequence in which you have to rendezvous

(continued on page 33)

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Star chart

Baseball

CB4
Activision
Sport
£10.99

★ ★
A poor copy of the Imagine Baseball game reviewed a couple of months ago. You get to field and bat, when fielding you choose the ball you pitch and manipulate the fielders. As batsman, you choose when, and if, to swipe the ball. Only one view is given, from the perspective of the spectator, with none of the nice touches which made the Imagine version bareable, mind you, at least we are spared the rare girls at half-time.

Chicane

BBC
Kempston
£7.95
Racing game

★ ★
With absolutely phenomenal timing, Kempston launch a racing game hot on the heels of Acornsoft's "Revs". Unfortunately, this game is rather left in the pits with a dead engine compared to Revs. As a game, it is quite good, but a simulation it isn't. Steering, throttle, break and gear changes are all included. There are six different circuits to race round.

Theatre Europe

PSS
CB4
£9.95
Wargame

★ ★ ★
Following on from their Midway game, this is set in the near future, when the treacherous Russians come charging over the North German Plain, bent on bringing the peace-loving west under their ruthless iron heel.

Behind this distasteful scenario is an even more distasteful game. Technically very well executed, the conventional battle is a dull slugging match.

(continued from page 37)

vous with a stratemaker, you are plunged headlong into the usual surreal mixture of balloons, ducks and what-have-you so beloved of the true sprite graphic craftsman. The ducks fly past in strict formation — the more ducks pass, the more points you get. But you will probably bend your rovers on an airship first.

If you survive to screen three, you will discover the purpose of your mission, which is to chuck bombs down horizontal airshafts to destroy the enemy base in the time-honoured way. The enemy whirlybirds contrive to get in your way and are practically invulnerable on this screen. If you like clenching your teeth and screaming, then this is the game for you. Paul Bond.

Taskmaster

■ CBM-64
■ Shoot-'em-adventure
■ Creative Sparks
■ £2.50

★ ★ ★
WITH excellent three-dimensional graphics and seven screens, this looks like the sort of game that US Gold was marketing for £14.95 a year ago. Maybe the programmers could have done a little more with the sound facility, but for £2.50 this example of the new Sparklers range from Creative Sparks is good value.

As the sun goes down on the first screen, the valley in front of the castle darkens and the zombies creep on like football supporters aimlessly wandering about and treading on you if you get in their way. Your man is armed with darts and you must keep blasting if you hope to see the second screen. This is the wizard of Dubbit Wood who appears at random and launches heat-seeking spells at you. Getting through this screen is more a matter of luck than good judgement — then you find yourself outside a cave in Vampire Mountain. You have to pick up four sacred statues and since your man is getting a big tired now he seems to walk more slowly and weave about. This is not good because bloodsucking bats issue forth from the mouth of the cave.

On the next screen our man is evidently getting into ancient history, as we find him by a stone circle. But the guardians of this creepy cromlech are the Devil Woodchippers of the Temple of Demons — a bunch of trigger-happy mad monks. Undeterred — our hero winds up in the cemetery being assaulted by ghouls. By this time I was so shellshocked I forgot to notice what the screens were actually called. Paul Bond.



Taskmaster.

SOFTWARE Shortlist



Magic Mushrooms.

Magic Mushrooms

■ BBC
■ Platform game
■ Acornsoft
■ £12.95

★ ★ ★
IF YOUR HEART sinks and a drowsy numbness steals over you at the mention of platform games Magic Mushrooms might be the antidote. It is a game in two parts, both a standard issue nine screen platformer and DIY platform construction kit. The balustrade fungi in question are what you have to pick up along the way.

The ready-made screens are frustratingly difficult if not impossible; but at the point at which you are about to give up in despair you can press

Gyron

■ Spectrum 48K
■ Firebird
■ Maze
■ £9.95

★ ★ ★
AT FIRST you might look on this game as a maze game crossed with a shoot-'em-up, with some nice graphics. But this would be to dismiss a game which gradually grows on you. It is more reminiscent of Rubik's Cube than a run of the mill maze game.

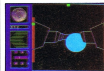
The first thing that strikes you is the graphics. You pilot a ball, or Hedron, around a maze. The maze scrolls smoothly past you as you move down the three dimensional trenches. Control is achieved with cursor keys or joystick. Moving the joystick to one side or the other will move the Hedron across the trench, and, if opposite the

Escape — wherever you move to the Edit screen. Along the top there is a menu of 15 items, among them escalators, monsters, crumbling and firm platforms, trampolines, and slides — all the items, in fact, that you would expect to find in a well stocked platform game.

It is now a simple matter to take out a troublesome monster or add a new stairway. Alternatively, you can give your imagination free rein by scrubbing one of the ready-made screens and building a new one. Either way, you can then save your creation.

If you are the one setting the traps and obstacles they probably will not present you with much of a challenge, although they may to others. But the real interest lies simply in designing new screens, an activity which turns out to be even more compelling than playing the game itself.

Peter Connor.



Gyron.

opening of a side trench, the Gyron will turn the corner.

There are a number of spheres rolling around the place according to predetermined patterns. These, needless to say are deadly. Then there are the towers, these are a different bottle of flesh all together. These are orientated in a particular direction, which you get from a small radar map of the neighbourhood. If you roll in front of these, you get shot.

Lee Paddon.

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NEWS o a e o r s s u t t t t h h h

The crystal ball

Incentive Software have released their popular Ket trilogy (Mountains of Ket, Temple of Van and Final Mission) for Dragon owners. It comes on one cassette and costs £9.95. Bored Of The Rings is an excellent parody adventure available on Microdrive or cassette for Spectrum owners. Mail order only from Delta 4 Software (04893 5800).

A helping hand

Fulvao Cerelessa of Rome is a great fan of English adventures. He had a spot of trouble with two of Scott Adams'.

In Spider-man:
Can't get the bio-gen
LLAH MORF MEGO IBTA
BEWT DOOS
Electro a shocking
problem?
ORTC ELEG NITT IHER
OFEB SMRA S'KC OROT
COOB ARG
In Sorcerer of Claymorgue
Castle:

Can't open the book?
TFOL EHTM ORFT IPOR D
Battlemind tin-can elusive?
KQIR EYDOR IRTME HTLL
EPBN AEDT SAC
Gary Blunden of Ongar
can't shift the bear in
Adventureland.
RAEB EHTT ALLE YTSU J
In Sutton Coldfield, M.
Poynton is wrestling with
Zork 1:

In the dark in the Dratty
Room?
MOOR TFAH SMOR FTEK
SABN ISTC EJBQ REVO L
From Warrington, Andrew
Parker is adrift in Zork 2.
What goes on the stands
on the Wizard's
workbench?
SERE HPSS SALG DERU
QLOC EHTY RT
Yours in adventure
adversity,
Hugo North

QUEST Corner

Our man with the brass lamp and the key to a thousand mysteries sheds light on new adventure programs. Lost? Never fear, Hugo North is here.

Key of Hope

- Spectrum 48K
- Games Workshop
- £7.95

FOLLOWING on from the excellent Tower of Despair comes this latest atmospheric two-part text and graphics adventure from Games Workshop.

The adventure features over 400 locations — though only some are illustrated — and has beautifully designed manuscript-style text.

The White Goddess of Truth has requested your aid in the battle against the evil Malnor. You must collect the scattered pieces of the Key of Hope to defeat the Demonlord.

You begin, confused, at the ruins of Castle Argent. Nearby is a plain ring, a spirited, snow-white stallion and a glittering sunsteel sword. It's all too easy to get lost when you start to roam around but with luck you should find a townsman. Pity it's too hot to pick up, though.

You must find water quickly else your bones may soon be bleaching in the sun and the search for the key over before it has barely begun. Your quest is definitely not going to be easy.

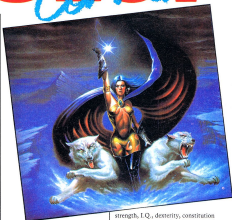
As before, a rich plot, plenty of locations and puzzles and fantastic prose. Highly recommended.

Mindshadow

- Commodore 64
- Activision
- £19.99 — disc only

IN MINDSHADOW, your aim is to find out your lost identity by working your way through a series of situations. The game sports some pretty impressive graphics of the locations but the adventure itself turns out to be a little on the dull side.

The early part of the game is set on a desert island. A little exploring soon uncovers such things as an



abandoned hut, a wrecked boat, a cave and plenty of quichoad. As you quickly find, the only way to get off the island is to hitch a lift on a passing ship. Unless you've got a suitable bribe, the captain won't take you.

The adventure has a sophisticated command analyser and a wide vocabulary. Help is available by calling on a giant corridor (I can't think why) who may assist you up to three times.

Not bad but at the price I can't see many people buying it.

Tyrann

- Oric/Atmos
- No Man's Land

CONFIRMING the popularity of the Oric/Atmos with the French, here comes a Dungeons and Dragons type adventure imported from across the Channel.

Don't fret that you'll need GCE 'O' Level French to play the game — apart from a few system messages like "Un instant s'op" and "Chargement en cours" — Loading in progress, I presume — all text is in English.

The aim of the game is to guide a band of six characters through a large, monster-inhabited labyrinth. Your ultimate mission is left un stated. At the start of the game, you select and name your group from six types: each character can be a warrior, magician, thief or druid. Their quality of their abilities —

strength, I.Q., dexterity, constitution and wealth — is determined randomly by the program.

Before you enter the labyrinth and whenever you return from the depths, you may visit the Emporium. Provided you have sufficient money, you can equip your party with various items such as weapons, armour, phials, parchments and spell books. Included in the list of 25 objects on offer are a white mouse and a baby dragon!

While above ground, you may also sell, swap or leave items and pay a visit to the Great Alchemist — who is excellent at First Aid.

Once in the maze, the display shows a stylised 3D view of the path ahead. Nothing visually exciting about this, just the usual perspective line drawings of walls and doors. As you move left, right or forward, the picture is updated.

The party may elect to camp and in so doing you can choose to catch 40 winks or inspect the current status of any member.

Apart from strolling round the maze, the only other activity is fighting. When you meet a group of monsters — they mostly come in groups and are only shown by name, not pictures — each character is given the option of parrying, fighting, casting a spell or running for their life. Each round of the battle is then described. When all your band is killed, the game is over — but you can bring all of them back to life and start again.

Use of sound and graphics is minimal and the game content and format is hardly original.

BEATING THE YANKS AT THEIR OWN GAME

Mark Shepherd, in beer-swilling T-shirt, and Mike Redman of SCR adventures.

James Hartley discovers that the British are doing well in the latest software war against the U.S.A.

THERE'S A MAN dressed up as a werewolf in one of Infocom's latest adventures. You might bump into him in the kitchen, or find him sidling up to you by the fireplace in the living-room for a chat. If he does, you might discover that he is married to that charming lady you met only a few minutes earlier at this high-society fancy dress ball. That lady is now lying dead in one of the adjoining rooms, strangled by the lariat from your costume and victim of a hideous crime in which you are the prime suspect.

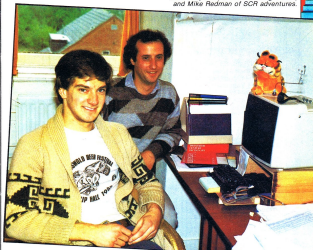
Suspect, as the game is called, boasts a whole crowd of characters like the werewolf, most of whom you can communicate with in one way or another, and all of whom seem quite capable of going about their business quite independently of you, the player. The game is typical of a whole new generation of text-only adventures that are beginning to make some of our British adventures look pretty silly. If you've been introduced to Infocom — and it'll cost you upwards of £40 plus the disc drive to run the program on — then you'll understand immediately why Douglas Adams worked with Infocom on his excellent computer version of *Hitch-Hiker's Guide to the Galaxy*.

Different in a year or two

The reasons why Adams worked with Infocom are fairly obvious — a top-class software house working in an enormous domestic market — but in a year or two things will be quite different. British adventure programmers are fighting back and are now racing to develop new game systems that could end up making even Infocom look pale by comparison.

The main problem to date has been the hardware. Here in Britain hardly anybody has disc drives that can provide the sort of data storage needed for really complex games, and, unlike in the U.S.A., machines with larger memories, like the IBM, are scarcely thought of as *personal* computers. But, paradoxically, it's limitations like these that are now providing the basis for a new push forward in British adventure software.

"It's been very frustrating," says Pete Austin of Level 9 — generally reckoned to be Britain's leading adventure software house, "and over-



coming machine limitations has become a way of life for British programmers, and it's helped us to develop techniques that could be very important when we have machines with discs and larger memories."

Pete's brother, Michael, is hard at work — with yet another brother, Nick — developing an entirely new adventure system that looks like giving the competition a good run for its money. In fact, he's already reached the point where he's no longer that impressed with Infocom.

"At the low programming level their games really aren't that clever. Their compression routines are virtually non-existent and I'm not at all impressed by the speed — especially on the Commodore. Our market here may be about two years behind, but as soon as discs become available, we'll be ready to make a huge leap forward."

Host of advanced features

The system that's being developed by Level 9 boasts a whole host of advanced features. First, a new compression system that uses a combination of stored dictionaries and character encoding — based on the frequency of different characters — makes possible a vocabulary of between one and two thousand words. Previously, adventurers have had to struggle with game with anything from 200

down to as little as 20 or 30 words.

Objects that you can manipulate during the game will no longer just be things you can pick up or drop — you'll be able to look inside them, or use them as containers to carry other objects from place to place, and of course there'll be plenty of characters to meet on the way.

"I'm trying to work towards a soap-opera type of game," says Pete, who tends to be responsible for the design of Level 9's games, "and I'm aiming to develop characters with whom the player can get emotionally involved. As memories get larger, there's no point in just adding more puzzles — you don't want people slaving away for more than a few weeks to solve a game. You're better off using the space for entertainment, and characters are a good way of doing it."

Although future Level 9 products will tend to get more and more sophisticated, the company is ensuring that programs don't become too slow and cumbersome. On the new Spectrum system that it is working with at the moment, the player can carry on entering commands while the graphics draw simultaneously. And where graphics are concerned, Pete sees new machines — like the new Atari range — as providing tremendous potential for the use of landscaping techniques, somewhat

similar to those pioneered by Mike Singleton in the very successful Lords of Midnight series.

Level 9 is perhaps the best known British adventure house, but it's not the only one to be hard at work on developing more powerful systems. One small company, which to date has produced only one game — Castle Blackstar, distributed by CDS — looks set to become a household name over the next couple of years with an adventure system that will certainly rival that of Infocom and could force Level 9 to look to its laurels. SCR Adventures is the brainchild of Mark Sheppard and Mike Redman, two enterprising 24-year-olds who graduated in Computer Engineering from the City University in London and are now hard at work on an adventure development system of truly epic proportions.

"Text is best"

"It's been so frustrating, having good ideas but not having the memory or the discs to produce them on," complains Mark Sheppard. "The computers in this country just haven't been up to it, but as soon as this country goes to disc we'll be ready to jump in." SCR's system has been developed using the language C, running under Unix, and although it's still early days, it already outperforms the system used by Infocom in the notorious Zork trilogy. Highly efficient compression systems and a very complex parser to interpret the users inputs both work together in a framework that can cope with multiple interactive characters, container objects, and even moving vehicles for the player to drive from one location to another and so on.

Unlike Level 9 and like Infocom, SCR is aiming at the text-only market. "Most adventure graphics just use the same basic forms over and over again," says Mark, "and what's the point of seeing the same tree in every location, even if it is a different size and in a different place. With text, you can have a different tree in each place." Always provided, of course, that the text can live up to what's expected of it but, judging from Castle Blackstar, its first release, SCR is quite capable of wielding the pen effectively, although both Mark and Mike seem rather hesitant to talk about Blackstar: "It's very dated now, and I don't like to be reminded of it," says Mark, although others obviously disagree — the game was recently voted one of the top 10 best adventures.

Some surprises

There are some surprises, too, to be found where new adventure systems are concerned. One company that isn't usually associated with adventures and which is keeping things very hush-hush is Mastertronic. It is hard at work on a system that comprises two basic modules, a database input/management system and control module to access the data and provide higher level game-play routines. Interestingly, the system has been developed using the Forth language.

Stephen Kirk of Mastertronic has nothing but praise for Forth: "We can have a library of primitives that access records, provide input/output, parsing, and so on. It's an extendable language and gives us a five-times saving in time over using assembly language." What's more, it enables them to develop software and



produce it simultaneously over a wide range of machines — essential in the British market where there are still substantial user-bases for what might normally be considered minority machines.

Adventure fans will doubtless be excited to learn that Mastertronic's new game is being designed by Sue Gaccardi, who designed the very popular Lords of Time adventure for Level 9. It's also working, in conjunction with Roy Carnell, known to many adventurers as the man behind The Wrath of Magra, on an epic game that has been marketed by Mastertronic under the Mastervision label following the collapse of Carnell Software.

Mastertronic, however, is being careful not to leave cassette users behind in its search for bigger games. The company reckons that its system will be able to produce 250 location games plus graphics to run in Ram without discs, using only two separate loads from cassette — Wrath of Magra needed four separate loads.

Stephen Kirk reckons that their system will "just grow and grow. It'll give us a far greater diversity of input for our games, so we will be able to branch out into whole new areas, for example adapting ideas from books, films, and video, and accepting scripts from well-known writers" — like Douglas Adams, perhaps.

But the best news for the adventure player is yet to come. Although all the systems mentioned above will be used exclusively by the companies concerned to develop their own products — though perhaps from your ideas — there are also powerful programs to be released over the next year that will enable you to challenge Infocom at its own game!

"It's more complex"

You may well be familiar with the popular Exploring Adventures series of books, published by Duckworth for a wide range of machines. The system in these books was concerned with simple two-word, verb-noun, Basic adventure programming, but now author Peter Gerrard is at work on an enhanced version which will, he hopes, be ready for release in September of this year.

"It's much more complex than the old system," says Peter, "and the majority of it is in machine code rather than Basic. The command parser is far more sophisticated and the location descriptions can be heavily compressed so you can fit more in." Peter also sees interactive characters as being very important to a good game: "If they work, they make it impossible to play the same game twice", he says, and he's currently working on

(continued on next page)



Red Moon



Level 9 Computing



Red Moon is Level 9's new release but don't read too much into the title even if Level 9 does share High Wycombe with a USAF bunker.

(continued from previous page)
a game in conjunction with his brother Mike that has got him very excited: "The results have been better than either of us could have done on our own," and with any luck, using

Peter's new system, adventurers all across the country will soon be able to join in the fun. "After all," says Peter, "it seems silly to develop a system and then keep it all to yourself." If only everyone else felt the same way.

Last, but not least, there's the famous, or infamous, Quill. Produced by Gilsoft, this adventure development system has already introduced thousands to the enjoyable art of adventure programming, and it now seems very likely that an enhanced version of the program could become available in the not-too-distant future. "We are interested in producing a more advanced Quill," says Tim Gilbert of Gilsoft. "So far I've definitely felt frustrated — people have relied far too much on cassettes but now, at last, disc systems are becoming more widespread, and with machines like the QL we can have networked games and multi-user adventures, though I have my doubts about the QL's speed capabilities for more than about three fully-interactive characters."

Developing the Quill and the Illustrator graphics program for different machines is taking up a lot of Tim Gilbert's time at the moment, and he's understandably cagey about his plans for the future but, like Peter Gerrard, when he does come up with the goods, you can be sure that he won't be keeping it to himself.

HISOFT

High Quality
Microcomputer
Software

FONT 464 is an easy-to-use program enabling you to design, edit, and move your own characters and graphics for simple use in BASIC programs. There are 6 pre-designed fonts and sophisticated printer-driving software which allows high-resolution screen dumps and letter writing on Epson compatibles or the DMPI.

ULTRAKIT is the most powerful interactive toolkit yet for ZX BASIC. All the features you will ever need:

AUTO BREAK COPY DELETE EDIT FIND
GOTO HIDE INFORM JOIN KEY LOCK
MOVE NUMBER ONEERROR PUT
SEPARATE RAMTOP SUBSTITUTE
TRACE UPDATE VARIABLES WARN
CRUNCH CRUNCH REMKIL PACKER
MAP DISC CASE TIME ATIME
ALARM PRINTER KMODE RESET and
much more. It comes with a FREE tape
header reader.

DEVPAK is a complete machine code development package. It is the second one that many people buy, because after the first one they know what to look for! The 'front panel' debugger is the only way to really see programs in action, and assembly from multiple source files is fast enough to satisfy its most demanding users — ourselves.

Pascal is a valuable educational and development tool as well as running typically 40 times faster than a BASIC equivalent. Our compiler is an almost full implementation which compiles direct to machine code (no slow P-code). Multiple file inclusion allows very large programs to be compiled.

C combines high-level structuring with direct control over the machine, all at compiled speed. Our compiler is now available from good retailers and has proved extremely popular. It supports all statement types (plus inline code) and over 40 operators; whilst char, int, unsigned and combinations using pointers, arrays, structures, unions, functions, and typedef are all allowed data types. External and static variables can have initialisers, whilst auto variables support recursion. There are six preprocessor directives and over 40 library functions with a selective inclusion scheme.

MON QL is our latest product and our first on the QL: it was written by Andy Pernell, who has a great deal of experience on the QL. It is similar in style to the well-known MON front panel in DEVPAK and includes additional job control and multi-tasking support. It also catches system exceptions and includes fixes for QDOS.

Product Price Table

	Pascal £	DEVPAK £	C £	ULTRAKIT £	FONT 464 £
ZX Spectrum	25-00	14-00	25-00	9-45	
Amstrad CPC464	29-05	21-85			7-65
MSX	29-05	19-85			
CP/M-80	39-05	39-85			
Sharp	39-05	25-00			
Sinclair QL		19-00 (MON QL)			

All prices are for cassette versions (except CPM and QL) and include VAT and p/p in the UK. Please contact us for export orders, disc formats or detailed technical — information packs. All products are available by mail order: please send a cheque or Postal Order. Sorry, we do not accept credit cards.

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by John Braga

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and the
Amstrad
CPC 464

by Ian R. Sinclair

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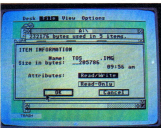
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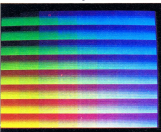
DR Logo will be built in on Rom.



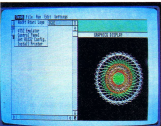
A cat for the mouse — hi-res graphics.



Gem — controlling the WIMP environment.



Op Art on the ST and below Logo graphics.



SUPERMICROS

FEW COMPUTERS HAVE generated as much interest as Atari's ST range, first announced in January. The 130ST, in particular, promised most of the features the average home computer owner would want to see in an ideal machine: 128K Ram, a powerful 16-bit processor, tremendous high-res graphics, an extensive array of ports, a high capacity disc drive, a Midi interface, and a mouse — at an unprecedentedly low price; not much more than the cost of a BBC. And to clinch the matter the ST computers run Gem, Digital Research's Graphics Environment Manager.

Gem is an operating system which gives the STs all the capabilities of Apple's Macintosh — icons, windows and pull-down menus under the control of a mouse. Unlike the Macintosh system, Gem has the advantage of being able to use colour and is already running on a number of other computers such as the IBM PC and the Apricot. Software written for other machines can be converted to the Atari fairly easily.

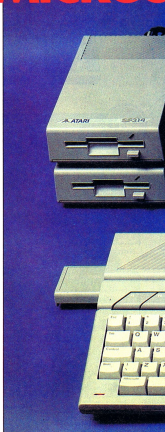
For the moment, however, the 130ST will not be sold in this country, and the machine we looked at, the 520ST, will cost somewhere between £750 and £800. This price may seem to be way outside the budget of most home users but it includes a 500K 3.5in. disc drive, a high-res monochrome monitor, 512K Ram, and a mouse. Along with the hardware there is an impressive list of software: TOS — the Tramiel disc Operating System, Gem, Gem Desktop, Gem Write, Gem Paint, DR Logo and DR Personal Basic.

With the exception of TOS these programs have been bought under license from Digital Research. But the problem of tailoring them to fit the ST seems to be taking longer than Atari anticipated. DR Basic, for example, which is being converted to give the user access to Gem's graphics, is not yet running. On the review unit the software was loaded in from disc. When the 520ST appears in the shops in September the software will be held in 192K Rom.

The computer and the peripherals have a common styling which looks businesslike, but tends to take up a lot of desk space. The keyboard unit is large — the price you have to pay for a nicely-spaced keyboard layout. The quality of construction of the computer and peripherals is good with no signs of patching.

Inside, the processor is a Motorola MC-68000 running at 8MHz and capable of addressing 16Mbytes of contiguous Ram. This is perhaps the best of the 16-bit devices, but do not make the mistake of thinking that 512K Ram is equivalent to 512K in an eight-bit processor environment. Code is stored as a minimum of two bytes — a word — and invariably a lot more memory space will be used. The overall effect will be to gobble up memory, and there is no means of externally extending the 512K Ram. For those readers used to eight-bit machine-code programming, a ratio of 75 percent seems about the effective memory for comparable programs.

The Atari ST contains the following peripheral support chips: a 6301 which scans



the keyboard, mouse and joystick ports, buffering the data in the keyboard queue; an MC-68901 which services communications and interrupts; a FD1772, floppy-disc controller supporting up to two drives; and the YA-2149, Yamaha's equivalent of the Texas AY-3812 sound chip. An MC-6580 provides the interface for the Midi functions and another MC-6580 provides the RS-232 interface.

In addition there are four special Atari ULAs which function as memory management, DMA, ancillary functions and graphics. There is no hardware character generator — it is all done in software. The memory chips consist of 16 256K Ram devices and six 32K Eproms.

The U.K. keyboard sports an extra key compared to the American computer. The left-



ATARI 520 ST

Now Kathleen Peel has
seen the future of
microcomputing — but
does it work?

hand shift key has been split in two, to allow the *i* sign to be shift-4 and hash to be repositioned. The keyboard consists of a 60-key typewriter-style portion, an eight-key cursor control, portion, an 18-key numeric keypad and 10 function keys. The keyboard feel is uniform, consistent and eminently suitable for word processing activities.

There is no internal speaker and the sound is reproduced from the attached display unit speaker. Nor is there a battery back up to the internal clock which must be set at switch on to provide accurate date/time stamps to files.

The external connections are numerous and will meet most requirements, the only notable omission being the inability to add on more memory externally.

The peripheral ports include two joystick ports on the right-hand side, one configured for a mouse. On the back are a reset button, on/off button and power supply socket, Midi in, Midi out five-way Din sockets, TV, monitor — composite and RGB — 25-way RS-232 socket, Centronics which also functions as an eight-bit bi-directional port, floppy disc controller, a 19-way D-shell direct memory access port that can be used for the attachment of a hard disc and a Rom expansion port on the side.

The Midi interface acts as a sequencer and can be used to perform step, time, note and trigger data entry. The Midi interface can also be used as a network link — as can the bi-directional Centronics port, the RS-232 and the hard disc port.

There are a number of high-level languages available — DR Logo, Forth, C, *Assembler* — but unfortunately the one I wanted to see was unavailable — DR personal Basic.

It seems strange to offer Logo at this level. Presumably Atari wants to attract educational users. My own view is that this and most other high-level languages are irrelevant to the real world: academics may favour the language but being an experienced Logo programmer will not earn you any credit with employers. Basic, by contrast, is a language that is likely to survive, and provides a useful general programming background; Cobol and Fortran are, likewise, still relevant for commercial and engineering applications; while C is the language

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for the future — most software tools, including Gem and CP/M 68K, seem to have been written in it.

The other software supplied with the ST includes Gem, Digital Research's integrated operating system. Gem provides an initial interface between the operator and the machine through icons, pictorial representations of facilities or devices the operator wishes to use. Move the cursor over a symbol of a dustbin to indicate that the current document is rubbish and no longer required, press the mouse trigger and its gone! Well it saves typing New.

Mouse action smooth

The Mouse action appears smooth and is placed over the icon and the trigger pressed to select an activity.

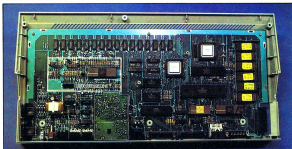
Gem Desktop provides the working shell that allows loading, copying and general house-keeping. Gem Write is a word processor based on Volkswriter and Gem Paint, is a similar program to MacDraw.

There are three graphics modes, 320x200 in 16 colours, 640x200 in four colours, both from a palette of 512 colours and 640x400 monochrome. Although the windows and their contents were capable of being moved virtually instantaneously using the menu data buffer, there were times when listing text seemed relatively slow. This is probably caused by making calls serviced through multiple layers of operating systems.

The sound generator has one noise channel and three tone channels. Easy Basic access through a macro language similar to MSX machines, one of the few parts of the MSX specification that I like, is not available.

50 titles being developed

The number of applications that currently run under Gem is very small, but there are well over 50 titles being developed by U.K. software houses alone. Atari intends to keep software prices under \$100 for a single piece of software and hopes that \$50 will be nearer the norm. A Telex emulator is being developed and



The Opposition

QL, the QL has 128K RAM, costs £400 and comes complete with adequate software. Adding a b/w monitor and enough memory to reach 512K and takes you up to £800. On that basis, it's not worth thinking about. The only reason for buying a QL is the £400 entry price if you already have a monitor or TV and the 48-hour software support that comes with the machine, a very important item not to be underestimated. All software is likely to run in the 128K, and some good packages are beginning to appear.

Apple's Macintosh, at about twice the price and limited to black and white, is the



Take your pick: 5Mbyte or 1Mbyte.

should soon provide the ST with yet another use.

Documentation for software developers from Digital Research appears to be comprehensive



Spot the Midl — a DIN's eye-view. machine on the business side that the Atari ST is most likely to challenge.

IBM PC. The Atari ST has the ability to run in PC mode and use some PC data files. It is unlikely that PC DOS programs will run on the Atari.

Act Apricot F1E, at its current price of £600 for a 16-bit 8086 computer, with 128K RAM, CP/M 86, Basic and a 315K formatted 3.5in. Sony disc, does seem rather good value when you consider the wealth of software available. The Apricot F1 is available for about £1,000 and has the considerable advantage of also running MS-DOS, 256K Ram, a 1Mbyte unformatted disc and a substantial set of software packages. Not quite as good a hardware specification.

Commodore's Amiga is the cloud on the ST's horizon and on a technical level, the only other reasonable alternative besides the Apricot.

and of high technical quality, hopefully forming a good platform on which to base the Atari manuals.

The Atari discs are 3.5in. Epson floppy drives. The SF354 gives 500K and the SF314, 1Mbyte unformatted storage. To load the TOS image file of 200K took approximately 35 seconds which is a very reasonable figure for low-cost drives.

Monitor display good

The monitor display quality was good, but was limited to 640x200 maximum by a protection circuit which is employed to prevent phosphor "burn-up" in low and medium resolution monitors caused by the higher frame rate used in high-resolution mode. One of the ST's unusual features is that it checks to see what sort of monitor is attached — RGB or composite video. It then selects the graphics mode appropriate to the monitor's resolution.

Gem provides an integrated operating system approach which is very successful in providing a simple entry to computing for the uninitiated. But at this level, it is the application packages that provide the user-friendly aspects of the program, the operating system itself ensuring a common approach. PC-DOS compatibility is really limited to data files only, it is unlikely that programs will actually run.

CONCLUSIONS

■ The software problems will be fixed as the computer is systematically debugged and there is no inherent problem with the hardware. All comments relate to Rom details but what should not be underestimated is the time it will take to fully debug the amount of software provided. It is not a three-month exercise as the cause of every obscure fault must be diagnosed and the cure tested to ensure that it does not have any effect on associated code.

■ The current market has been filled by products that were used either to:

- Teach someone about computing.
- An upgrade.
- For a specific applications games, or business packages. Further market penetration is

becoming increasingly more difficult for new products as they vie for new market sectors. Obviously there is a huge market out there that I believe is extremely price-sensitive, and £800 is getting very close to the limit for a budget-priced serious micro.

■ The 520ST is technically excellent. I understand why the 520ST was the first device to appear in the States where disposable income is higher, but in the U.K. the machine that I feel could have made Atari a fortune is the 130ST, provided it ever makes an appearance and at its launch price.

■ The 520ST hardware is the new standard by which others will be judged. Do not worry too much about the software problems. They may take time to debug but when they have been, this will be a very good computer.

Cash & Carry

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Elsie Dee takes a byte or two out of the new Apricot FIE and likes what she tastes.

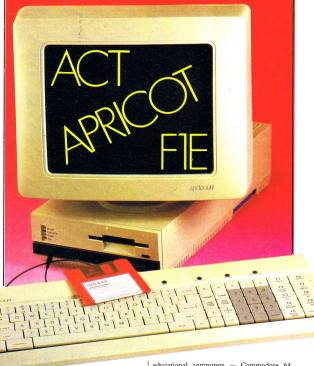
ACT DOES NOT MAKE home computers. But the latest price cut on the Apricot FIE has sent it storming down into BBC territory with a specification of 128K Ram, 16-bit 8086 central processor and built in 320K Sony 3.5 in. disc drive for £685 including VAT. And just in case Acorn does not get the message ACT is also launching a £30 B-Tran program which will allow the FIE to run most BBC Basic programs.

Unlike the expanded home micros usually found in this price range the FIE is a cut down version of the F1 business micro which uses a mouse and icons as a user-friendly alternative to the keyboard. You can expand the E up to F1 spec including a mouse but even in standard form the E comes with a full colour icon display. The machine looks professional with its separate keyboard and slimline shoebox sized processor unit cum disc drive which doubles up as a base for the monitor, although it also has a video output to an ordinary TV.

The battery-powered keyboard is a little too like the QL's with the keys cut from a single slice of plastic rather than individually moulded. Batteries are needed because the FIE has a "look no strings" TV-remote-controller style infra red link to the main processor box. This has the advantage over the usual curly telephone cable connection that you don't feel like an elastic band is trying to tug the keyboard out of your hands, but the disadvantage is that unless you keep it lined up with the processor you can lose keystrokes. As an afterthought to try to overcome this ACT has added a light pipe which restores the physical connection between keyboard and shoebox — unfortunately the pipe is not as well made as the rest of the machine and ours broke in normal use.

The FIE comes with ACT's own icon-driven interface called Activity. Getting started couldn't be simpler — you just switch on and feed in the demonstration disc which introduces you to icons. These are a series of diagrammatic representations along the bottom of the screen labelled Activity, Files, Utilities, Disk, Help, and Exit. You just use the cursor keys to position an on-screen arrow over your choice

SUPERMICROS



and then use the Enter and Return keys to call it up.

This Apricot also comes with MS-Dos 6 the IBM PC style operating system used in most business micros — although the FIE is not IBM compatible. Also supplied on disc with the FIE is GW-Basic, Diary and Sketch programs.

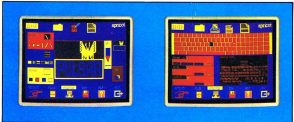
Unlike the second generation home and

educational computers — Commodore 64, BBC, and Spectrum the ACT FIE is a serious 16-bit micro designed to upgrade into a full hard disc-based business system if necessary.

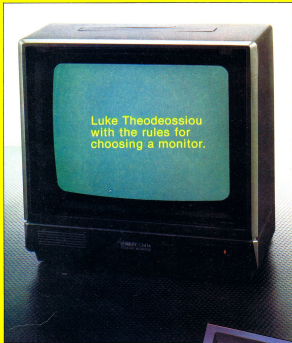
Unlike the QL the Apricot has a reliable built-in mass storage system and software already developed for serious use on its larger cousins in the ACT range.

Although the FIE can display four out of 16 colours in up to 640 by 256 resolution it does not pretend to be a games machine. Programs like Infocom's Hitchhikers guide to the Galaxy are available but the Apricot's strength is the range of business software which its operating system makes available to it which paradoxically may increase its chances in the educational market. Brian Andriola, managing director of ACT claims that students "need the experience of using serious industry standard software which normally will not run on 8 bit micros."

It may be next year before new generation micros like the Atari 520 ST and Commodore Amiga are on sale with the range of software the ACT already has, so for the moment the FIE wins the battle of the supermicros. ■



PICKING THE TV M



ing but watch out. It's likely to be several years old and its display quality is not going to be as good as that achieved by modern sets, even if you found one which was in absolutely perfect condition.

Another mine field is making the right choice, not just what make but also which model and most important of all judging its condition. Unless you are a TV engineer you could end up wasting quite a bit of money on junk. Even if you found a good one, it's very much more likely to go wrong and repairs are expensive. All in all, the risks are just too high.

The other problem which is common to all TV sets, old and new alike, is the display quality when used in conjunction with a computer. Colours lack contrast, they are noisy, there are crawling interference patterns on the screen, etc. All this makes any serious work such as text processing or program compiling virtually impossible with eye fatigue into the bargain.

The reason for this is that the computer generates three distinct signals — Red, Green and Blue — at TTL level. These signals are the cleanest possible and are used to drive RGB monitors. In order to enable owners to use their domestic TV sets, two further stages of processing are necessary. The first is to combine the three signals, together with the synchronising signal — Sync — to produce a composite video signal. This is done for a particular broadcasting system standard — for example, most of Europe, including the UK, uses a colour encoding system known as PAL.

This signal is then passed to a modulator which converts it to a radio frequency — RF — signal which is just like the signal picked up by your TV aerial. All this additional processing very nearly wrecks the quality of the

Left: Fidelity GTM 1400 colour TV monitor.
Below: Ferguson TX.

WHEN WE LOOKED at monitors — see *Your Computer* December 1984, page 84 — we made it clear that in our opinion dedicated standard resolution monitors did not provide good value for money. We therefore suggested that anyone in the market for a monitor should first of all determine the primary use the equipment is to be used for before even starting to look at what's available.

If you are currently using your domestic TV set as your VDU, then you are likely to be suffering from two main problems. The first is conflict of interests — you are interested in using your computer, whilst the rest of the family is interested in watching TV. The result — conflict! One possible solution to this is to buy a second-hand colour TV. Current prices range from around £75 to over £200. The other possibility on similar lines is to buy a new 12in. monochrome portable TV for about £55.

Neither is particularly satisfactory. A black and white TV is really quite useless for games and is just as bad — from a display quality point of view — even if all you ever do is text processing. The best advice here is — forget it. A second-hand colour set is perhaps more tempt-



MONITOR FOR YOU

A few basic rules will help clarify any grey areas.

1. Remember, all current TV-monitors are standard resolution only. If you require higher resolution, then a dedicated medium or high resolution monitor is the only answer.

2. If you connect your computer via the aerial socket, the results will be identical to an ordinary TV. Monitor performance is only possible when using "direct" connections via the SCART socket.

3. Beware of monitor-look TVs which are not necessarily TV-monitors. This is easily checked but do make sure.

4. Before buying, check that your computer has RGB outputs, or at least a composite video output. If you have both always choose the RGB output for best results.

5. Sound can also be connected directly via the SCART socket but it's hardly worth it except for music programs or similar.

6. Although TV-monitors come in a variety of sizes, the larger sizes are best suited for use with video recorders. The optimum size for home computer applications is 14in.

7. FST (Flat Square Tube) equipped TV-

monitors are becoming available but the choice is limited and prices higher. FST does have some advantages over conventional tubes as well as being more pleasing on the eye but in our opinion it's not good value for money yet.

8. Think about your future display requirements before choosing your VDU. As always the best advice is to insist on a demonstration before buying.

Happy viewing!



original RGB signals. The job is finished off by your TV set which has to convert the aerial signal back to separate RGB signals!

The sensible approach of course is to bypass all this encoding and decoding. This is where the TV-monitor comes in. Essentially, all it is is an ordinary TV set equipped with additional input sockets to enable direct connection from the computer to the appropriate point inside the set. Of course it's a little more complicated than that.

Amplifiers and impedance converters are used to ensure correct conditions for the signals; the TV signal has to be switched off; and the chassis has to have complete mains isolation. Although converting an existing TV for RGB operation is a theoretical possibility, the hassle, the expense and the safety risks involved make this proposition a definite non-starter.

For little more than the cost of a standard model, you get first class RGB monitor performance for your computer; a much better picture from your video recorder — by using the composite video input — and of course a TV set as well!

Right: Philips CT 2007 receiver monitor.

The buyers guide below is a fairly comprehensive chart of small screen TV-monitors currently available from high street retail shops. Most manufacturers also offer large screen sizes but these have been omitted from our chart. Some computer retailers have in the past offered other makes, mainly far eastern imports, but the trend now is to

stay with well known brands. Shopping around may secure some savings but at best these will be very modest. Our rating system — from 1 to 10 — is a personal assessment and takes into account price, availability, ease of use, general performance, etc. It is intended as a guide only and we strongly suggest that you view before you buy.

Brand name	Model	Size	FST	R/C	Price	Connecting leads	Remarks	Rating
Ferguson	TX MC01	14in.	—	—	£229	Included	Auto source switching Recommended	8
Fidelity	CTM1400	14in.	—	—	£219	—	Good value	7
Finlux	1014RGB	14in.	—	—	£275	Optional	Pricy	4
Grundig	P40-125	36cm	Yes	—	£269.95	—	Good but pricey	5
Grundig	P40-145	36cm	Yes	Yes	£299.95	—	Good but expensive	4
Mitsubishi	CT1501BM	36cm	Yes	Yes	£299	—	Good but expensive	4
Philips	1120	9in.	Yes	—	£300	Optional	Good but expensive	3
Philips	2007	14in.	—	—	£239	Optional	DIN socket	6
Tatung	TN1441	14in.	—	—	£199	—	Very good value; recommended	8

Key: FST = Flat Square Tube
R/C = Remote control

ATARI SYSTEMA

Competition RESULTS

APRIL'S COMPETITION to win a complete Atari system attracted one of the largest entries in living memory. Probably the prize was the main draw but contestants also appeared to relish the challenge we set — to write an Atari-related limerick.

Unfortunately many entries took a broad view of what a limerick is. Thus we had odes to Atari, sonnets, rhyming couplets, 100 line verse epics, blank verse, ditties and numerous other verse forms. But, good though they were, we had to disqualify them: if it doesn't have five lines it is not a limerick.

It was also probably a mistake to end one of your lines with the word Atari. As there are only a limited number of rhymes with Atari most entries of this type tended to sound the same. They usually involved young men on safari, driving Ferraris, and sipping Camparis. One of the best of these was V. Skinner's: A compulsive eater called Marie Likes to nibble while drinking Campari Between liquid sips She's mad about chips And gets far better bytes from Atari.

In the same line B. Axelford almost clinched it but stretched the rhymes too far: Charles and Diana's son Harry

Was given a brand new Atari But Prince William was mad Cos just a Spectrum he had So he threw the Atari Atari.

Perhaps M. Eaton had the right idea with his succinct:

Atari Atari Atari
Atari Atari Atari
Atari Atari
Atari Atari
Atari Atari Atari

J. Outram likewise came up with something different:

A computer fanatic from Rhodes Wrote a program for making up odes The Atari possessed him But his Spectrum outguessed him Fly producing last lines much longer than any of the others and with no apparent rhyme.

Among the other contenders were a number of highly competent entries from abroad. In fact E. Teler's from Jerusalem was one of the few which caught the true spirit of Edward Lear: A man known to me and to you

Runs Atari (ran Commodore too) He thinks it is nice To fight elephants with mice I think he should open a zoo.

D. Williams' limerick also struck the right nonsensical note although it goes astray in the last line:

Listen to Jumping Jack Tramm He's cutting the prices like ham His methods are sound XLs for the pound You get more for your Paks from this man.

All these were in the running but after much deliberation we awarded the prize to Marie McNally, 8 Raglan Gardens, Caversham, Reading, Berkshire, for: Mixing up Singapore and Jakarta Jack Tramiel would call corrupt data But it's nothing so sinister Just the lady Prime Minister We should swap for an Atari — it's smarter.

The mix up referred to was made by Mrs. T. on her recent visit to the Far East.

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ATARI 600XL ENTERTAINMENT PACK

Great news for games addicts who appreciate high quality graphics and sensational arcade action generally. For only £69, you can buy a 16K Atari 600XL Computer with two 16K arcade ROM cartridge files and a joystick. These two ROM files are the famous arcade hit Donkey Kong and another favourite Qix (the only have a limited number of packs with Qix, when these run out, Qix may be substituted for an available entertainment cartridge of the same value). The 600XL Entertainment Pack offers real value for money and enables you to save £23.95, nearly half of the normal RRP of the pack items when purchased individually. Since Qix has a wide range of ROM cartridges available including arcade favourites such as Asteroids, Centipede, Missile Command, Popeye, Q*bert, Star Raiders, Super Cobra for only £29.95 each! The 600XL is a programmable home computer with the Basic Programming Language built in and if you later add a 1010 Program Recorder (CPL 1010 - £34), a range of hundreds of cassette programs will become available to you. The Atari 600XL is recommended as a first class games machine.

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PACKAGE PRICE (XLC 1600)	£59.90

£69

ATARI 800XL AND RECORDER PACK

The 800 800XL is packaged here with the 1010 recorder, an economical storage and retrieval unit, a small bit of arcade game and programming aid, all for a package price of only £129 (net XLC 1010), a saving of \$48.95 off the RRP of the individual items which total £174.96. The game included in this pack is Pole Position. Now on cassette from Atari, Pole Position is an accurate reproduction of Atari's own highly successful arcade driving game which has all the thrills and spills of the grand-prix race track. On the reverse of the cassette is a demonstration program of Atari's amazing sound and graphics capabilities giving an example of the high quality performance of the Atari 800XL. Also included is an Invitation to Programming cassette which takes you step by step through the first stages of programming in Atari Basic using Atari's unique soundthrough facility which allows pre-recorded human speech to be played through your TV speaker. All you need is a joystick (AT2 0430 - £7.95 for Pole Position), to be up and running with this package. The Atari 800XL in this pack comes with a 6000 two year guarantee.

ATARI PACKS - POWER WITHOUT THE PRICE!



ATARI 800XL + PROG. RECORDER PACK	
80K Atari 800XL	£129.99
1010 Program Recorder	£34.99
Pole Position + Demo Prog (C)	£3.99
Invitation to Programming 1	£19.99
Total if purchased separately	£188.96
Less Discount (save 58%)	£135.90
PACKAGE PRICE (XLC 1010)	£129.90

£129

ATARI 800XL AND DISK DRIVE PACK

This pack includes the 80K 800XL with a 1050 Disk Drive for mass storage and speedy information retrieval as well as a brand new adventure game and a powerful home file program, all for only £249 (net XLC 1050), a saving of £115.95 off the RRP of the individual items which total £364.96. The list of these programs is The Payoff on disk, a new adventure game which is a fantasy simulation in which you play the leading role. An exciting introduction to adventure programs which are always popular with a demonstration program of Atari's amazing sound and graphics on the reverse. Also included in the pack is Home Filing Manager to help you organise your files. It allows you to catalogue and file details of birthdays, books, your stamp collection or anything else which would normally require you to use filing cabinets. The instructions for Home Filing Manager are on the reverse of the disk and all the disks which come in this package are in protective outer sleeves. You get an extended two year guarantee on the 800XL and 100 free programs with the disk drive when you buy this package from Silica.

ATARI PACKS - POWER WITHOUT THE PRICE!



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80K Atari 800XL	£129.99
1050 Disk Drive	£129.99
Home Filing Manager (D)	£24.99
The Payoff + Demo Prog (D)	£3.99
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£249

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JUM

Brian Lewis saves Harrisburg from nuclear catastrophe.

Listing 1.

```

000023,150,20,20,107,62,0,20,20,54,23,151,36,90,16
9,149,211,179,74,52
100DATA20,252,254,62,127,255,255,255,240,240,240,24
0,143,143,143,159,240,240,240,240,79,127,255,255,240,24
0,240,240,120,104,152,104
200DATA240,240,240,240,241,242,242,241,241,241,2
42,106,115,179,241,240,240,240,240,186,217,186,240,240
,240,240,240,240,240,240
300DATA240,240,240,240,240,225,209,145,209,240,240,240,2
40,47,239,252,255,240,240,240,240,240,31,31,31,159,241,243
,247,199,239,255,255,255
400DATA11,0,1,0,255,0,5,0
500DATA112,40,16,220,136,0,0,0,240,240,240,240,119,1
19,119,102,240,240,240,240,107,136,0,0,240,240,240,240
,240,52,32,32
600DATA98,37,16,156,130,0,2,10,225,210,45,240,55,39,
127,70,98,98,145,240,100,155,0,2,10,225,210,45,240,100,37
,30,22
700DATA10,0,4,0,255,0,50,0,0,0,1,0,2,0,1,0,1,0,4,0,
1,0,1,0
800DATA240,150,195,240,240,240,195,150,240,240,240,0
,0,0,240,240,240,240,244,0,0,0,244,240,240,240,112
,40,112,240,240
900IF 0: 4000: TEMP=0: J: TEMP+1: FORT=0: T0225: READ:
F7J:0: NEXT: for=3:32: left=for+32: sou=JX+96: SP=sou-0: XP
=CP+32: rad=XP+32: wh=ad+0: Sul=wh+0: ai=sul+0: H2=ai+32
: FORT=0: T0225: F: H2: CP: T
90. setup LDA#52: STA#70: LDA#6C: STA#71: LDA#50: STA#
72: LDA#6C: STA#73: LDA#50: STA#74: LDA#6D: STA#75: RTS
100. right JSR setup
110 LDA#0: A: LDY#0: A: LDA#70: Y: STATMP, Y: INY: CPY#16
: BNE
120 LDY#16: B: LDA#70: Y: STA#72: Y: INY: CPY#0: BNE
130 LDY#0: C: LDATMP, Y: STA#74: Y: INY: CPY#16: BNE
140 CLC: LDA#70: ADC#40: STA#70: LDA#71: ADC#1: STA#71
150 CLC: LDA#72: ADC#40: STA#72: LDA#73: ADC#1: STA#73
160 CLC: LDA#74: ADC#40: STA#74: LDA#75: ADC#1: STA#75
170 INX: CPY#12: BNE
180 RTS
190. left JSR setup
200 LDA#0: A: LDY#0: A: LDA#74: Y: STATMP, Y: INY: CPY#
16: BNE

```

```

210 LDY#FF: B: LDA#72: Y: STA#70: Y: DEY: CPY#10: BNE
220 LDY#0: C: LDATMP, Y: STA#70: Y: INY: CPY#16: BNE
230 CLC: LDA#70: ADC#40: STA#70: LDA#71: ADC#1: STA#71
240 CLC: LDA#72: ADC#40: STA#72: LDA#73: ADC#1: STA#73
250 CLC: LDA#74: ADC#40: STA#74: LDA#75: ADC#1: STA#75
260 INX: CPY#12: BNE
270 RTS
280. scroll LDA#FF: STA#70: CPY#1: BEQ: JMP left: L: J
MP right
290. IX JSR reset: LDA#50: STA#0: LDA#60: STA#1: LDY#0:
A: LDA#0: STA#9A: Y: INY: CPY#6: BNE: STA#9F: STA#99: STA#
9A: LDA#15: STA#9F: LDA#F: MOD25A: STA#62: LDA#F: DIV 2
5A: STA#63: LDA#63: STA#60: LDA#F5: STA#B1: JSR amp
2V1 SEC: LDA#C2: SEC#5: STA#C2: JSR core: LDA#0: STA#76: LDA
#5: STA#77: LDA#0: STA#78: STA#79: STA#7A
300. star JSR print
310 LDA#0: JSR bomb: CPY#FF: BNE: CPY#1: JSR tech: CPY#FF: BNE:
p: JMP: p: p: JSR reney: LDA#99: CPY#3: BNE: JSR MISIL
: k: LDA#0
320. As: LDA#60: Y: EOR#62: Y: BNE#B1: CPY#240: BEQ#B1:
CPY#62: Y: BEQ#B1: INY: CPY#32: BNE#A1: JMP#C11: B: STA#9F
: JMP#dead: C:
330 LDA#1: K: LDA#9A: X: AND#1: CPY#0: BEQ#JS: TX#PHA: JSR
move: PLA: TX#X: JSR INX: CPY#0: BNE
340 LDA#97: CPY#FF: BEQ#0: JSR delay: C: LDA#0: STA#97
0
350 LDA#9F: CPY#1: BEQ#J: LDA#61: LDY#6E: LDY#FF: JSR#F
FF#4: CPY#FF: BNE#J: JSR sub: DEC#9F: SEC: LDA#A0: SEC#40: ST
A#A0: LDA#61: BEQ#1: STA#61: H:
360 LDA#9F: CPY#15: BEQ#J: LDA#61: LDY#6E: LDY#FF: JSR#F
FF#4: CPY#FF: BNE#J: JSR sub: INC#9F: CLC: LDA#60: ADC#40: S
TA#60: LDA#61: ADC#1: STA#61: H:
370 LDA#60: LDY#61: LDY#FF: JSR#FF#4: CPY#FF: BNE#J: JS
R left: L:
380 LDA#0: CPY#255: BEQ#0
390 LDA#61: LDY#6E: LDY#FF: JSR#FF#4: CPY#FF: BNE#J: JS
R right: C:
400 LDA#61: LDY#6E: LDY#FF: JSR#FF#4: CPY#FF: BNE#J: JS
R left: L:
410 LDA#9F: BEQ#J: CLC: LDA#60: ADC#40: STA#40: LDA#61: AD
C#1: STA#6E: LDY#0: LDA#6D: Y: CPY#240: BEQ#J: JMP#dead: K:
420 LDA#9F: CPY#4: BNE#A1: JSR left: A: LDA#9F: CPY#2: B

```

Your actual fighting area is eight times larger than the screen. However enemy planes have a wrap-around capacity which allows them to keep flying while you have run out of air space. You lose a life if you crash into the horizon, crash into an enemy plane or get hit by one of their bombs. However, as you are defending Three Mile Island there is a greater danger than losing your three lives, the danger of a nuclear explosion. On the main screen display you will see the word "Techs" and beneath it a number of small figures, if the enemy planes drop a bomb on your fuel pump building you lose a technician; lose all your techs and the resulting nuclear blast destroys everything including your remaining three lives.

To further the difficulty of the task set for you the enemy has invented a new heat seeking missile which unlike their attack planes can travel faster than you. This missile only appears after you have killed three enemy

This is one of the few scrolling games written for the Electron — the lack of scrolling games is mainly due to the large size of the screen memory. BBC users can get over this problem by using the 6845 chip — not present in the Electron — to control full screen scrolling via registers 12 and 13. To counter this problem I have used a screen window of exactly 32 bytes wide, which enables fast and easy handling of the screen display since when displaying the contents of the window the computer does not have an X position number larger than 255 thus enabling a simply loop involving only one of the computers registers.

There are two listings to type in, check, save and then run. The first program is the main machine-code program containing most of the graphics, sound definitions and all the machine-code routines while the second handles setting up the screen display, keeping the score, storing the high score table etc., although quite long, the program is well worth typing in as the finished product gives some pleasing screen displays and presents a very playable game. If BBC users wish to play Jump Jet Assault then they merely have to increase the contents of the x and y registers in line 460 of program 1 to a suitable value found through experiment.

[illegible][illegible]

(continued on page 55)

·JONAH·
·BARRINGTON'S·

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Timothy Closs provides continuous interrupt-driven background music for your diy games.

HOW MANY times have you wished you could boost your games programs with some background music as in Manic Miner, Antomania and Gilligan's Gold? Well, now your wish has been granted with Backboogie!

Backboogie will repeatedly play a piece of music, short or long, without interfering with the running of your own programs!

The program itself is 100 per cent machine-code and uses the Spectrum's interrupt system to run it. As a lengthy discussion about the system is not needed here, I will just say that the Spectrum can be made to run a machine-code program stored at a certain memory address every 1/50th second — this process is known as an "interrupt".

The Basic program in listing 1 helps you

compose your pieces of music and also stores some necessary data in the memory.

Let me explain how the program works. The music you compose is stored as a series of numbers, each representing one note, i.e.:

- 0 for C
- 1 for C#
- 2 for D, etc.

The Spectrum's own program for converting these numbers into values the Sound Generation Rom Routine can accept is too slow, so I have developed a faster routine using the data stored by the Basic program.

Having calculated these values, Backboogie calls the Sound Generation Rom Routine to produce a short musical sound before returning to your game.

Listing 1.

```

1 LOAD ""CODE
2 REM ***BACKBOOGIE***
3 REM *****BY*****
4 REM *****TIM*CLOSS***
5 CLS
10 GO SUB 1000
500 LET G=60672
505 RESTORE 2000: FOR H=1 TO 21
: READ K$: PRINT AT H,0;K$;AT H,30;K$: NEXT H
510 LET A=2: LET B=21
512 PRINT AT B,A;PAPER 0;" "
513 IF INKEY$="7" AND B>1 THEN LET B=B-1

```

(continued opposite)

S
P
E
C
T
R
U
M

B
A
C
K
B
O
O
G
I
E

(listing 1 continued)

```

515 IF INKEY$="6" AND B<21 THEN
PRINT AT B,A; PAPER 7;" ": LET
B=B+1
516 IF INKEY$="1" AND A>2 THEN
LET G=G-8: LET A=A-1
520 IF INKEY$="0" THEN GO TO 53
5
525 IF INKEY$="E" THEN GO TO 56
0
530 GO TO 512
535 FOR H=G TO G+7: POKE H,22-B
: NEXT H: LET G=G+8
540 LET A=A+1: IF A=30 THEN LET
H=USR 60148: LET A=29
545 FOR J=21 TO 8 STEP -1: PRIN
T AT J,A; PAPER 0;" ": NEXT J
550 GO TO 512
560 LET D=G-60672-2: POKE 60250
,INT (D/256): POKE 60267,D-(INT

```

```

(D/256))*256)
570 STOP
1000 RESTORE 3000
1010 FOR H=0 TO 20
1020 READ J: POKE 60416+H*4,0: P
OKE 60417+H*4,(J/96)
1030 LET K=437500/J-30.125: POKE
60418+H*4,INT (K/256): POKE 604
19+H*4,K-(INT (K/256))*256)
1040 NEXT H
1050 RETURN
2000 DATA "G#","G","F#","F","E",
"D#","D","C#","C","B","A#","A","
G#","G","F#","F","E","D#","D","C
#","C"
3000 DATA 261.63,277.18,293.66,3
11.13,329.63,349.23,369.99,392.4
15.3,440.46,466.16,493.88,523.25,55
4.36,587.32,622.24,659.24,698.44
,739.97,783.97,830.58,879.97

```

The game then continues running until, 1/50th second later, it is necessary to produce another musical sound of the same frequency as before. When a series of short sounds is heard in quick succession like this they give the impression of a continuous musical note.

The composer allows any note within a range from middle C up to 20 semitones above to be entered. Use keys 6 and 7 to move the bar up and down until it is level with the desired pitch. Pressing 0 will now enter the note and the bar will move across one column. You can delete a note by pressing 1 — the bar will move back one column. Continue entering your notes until you have finished your composition.

Pressing E will add final specifications to the machine-code routine and then cause you to escape from the Basic composer program.

Your music can now be saved, together with all the other necessary data and routines by typing:

SAVE "BACKBOOGIE" CODE 60180,0+500
and loaded by typing:

LOAD "" CODE

To "switch on" your music during a program, include:

POKE 65534,0: POKE 65535,237: POKE
65532,0: POKE 65533,0
RANDOMIZE USR 60180

To "switch off" your music, include:
RANDOMIZE USR 60190

First, enter the composer program in listing 1 and save it by typing:

SAVE "COMPOSER" LINE 1

Now New the program and type in listing 2. Run the program and enter the code in listing 3, working from left to right and from type to



bottom. When you have finished, the code will automatically be saved as Boogie.

If you do not wish to type in all the programs and code yourself, send a blank cassette, SAE and £1 to me at: 5 Western Drive, Shepperton, Middlesex TW17 8HJ.

Listing 2.

```

10 DEF FN H(H$)=16*(CODE H$(1)
-48-(7 AND H$(1)>"9"))+CODE H$(2)
)-48-(7 AND H$(2)>"9")
40 FOR N=60148 TO 60288 STEP 8
50 LET T=0
60 PRINT N;" ":
70 INPUT H$: PRINT H$:
80 FOR B=0 TO LEN H$-1 STEP 2
90 LET Z=FN H(H$): LET T=T+Z
100 POKE N+B/2,Z
110 LET H$=H$(3 TO )
120 NEXT B
130 PRINT " = ";: INPUT Y: PRIN
T Y
140 IF Y<>T THEN PRINT "INPUT E
RROR - TRY AGAIN": GO TO 50
150 NEXT N

```

Listing 3.

```

60148 : 2102581103580616 = 259
60156 : C5061C1A77231310 = 446
60164 : FA232323231313 = 447
60172 : 13C110ECC9000000 = 665
60180 : ED5E3E30ED47C900 = 950
60188 : 0000ED56C9000000 = 524
60196 : 0000000000000000 = 0
60204 : 0000000000000000 = 0
60212 : 0000000000000000 = 884
60220 : 2AFEFF7ECB27CB27 = 1161
60228 : E56F26000100ECED = 852
60236 : 4A56235E2346234E = 507
60244 : 6069CDB503E12322 = 884
60252 : FEFF2AFCFF3E00BC = 1308
60260 : 2B0C2322FCFFFF1C1 = 1062
60268 : D1E1FBC338003E26 = 1036
60276 : BD380218ED210000 = 541
60284 : 22FCFF2100ED22FE = 1099
        FF18E30000000000 = 506

```

THIS STARTED off as a seemingly simple editor. What I wanted was a means of preparing a data file which could be used by an assembler program to produce an interrupt driven tune. Once the code produced by the assembler had been installed, the tune would repeat itself until it was deactivated or the Break key pressed.

The problem with preparing a musical data file is that there needs to be a method of specifying the pitch and duration of the notes. Standard musical notation turned out to be the most sensible system to produce the file. Although this editor is based upon musical notation it is not presented as a music processor. It has a limited range of notes and, in particular, no capacity for a rest. It is, however, capable of producing simple tunes for accompanying games etc.

To make full use of the BBC's sound capacity it is not only necessary to manipulate the Sound command but also the Envelope command. Consequently, an envelope editor has been added to the system. Provision for a screen dump was included to allow the editor to produce sheet script.

What started out as a supposedly simple editor to produce a small data file became a fairly sophisticated project in its own right. The editor can cope with up to 200 notes over a one and a half octave range. The envelope can be modified over its full range; and will be saved with any data file produced.

Piano type envelope

To use the system enter listing 1, Inload and listing 2, Immune. Running Inload will define the characters needed for the main program and produce a default piano type envelope. The characters are printed as a check and the second program loaded. For disc users the name of the second program will have to be defined, for tape users a blank Chain " " statement will load the next program on the tape.

When loaded the editor presents the user with a blank page. To define a note its pitch and duration have to be selected. The pitch of the note is controlled by the cursor's position on the staff. The cursor can be moved up and down the staff using the up and down arrow keys. The left and right arrow keys move the cursor backwards and forwards through the tune.

The duration of the note is indicated by the symbol in the lower right hand corner. The duration can be increased with the R key and decreased with the L key. A note is entered at the current cursor position by pressing Return. If the cursor is in the middle of a tune all succeeding notes will be shifted along to

In this, the first part of his article, Fintan Culwin details a BBC editor with a simple background music facility.

make space for the note being inserted.

If a note needs to be deleted, pressing the Delete key will remove the note from underneath the current cursor position and move back any succeeding notes. There is space on a page for 20 notes. Moving before or beyond this automatically takes you onto the next page. If this is too pedestrian then keys F5 and F6 will move backward and forward one page at a time. Pressing F2 will play all the current tunes using the current envelope.

After coming to terms with the musical setting the envelope editor can be invoked by pressing the F7 key. To understand the screen it is necessary to consult the User Guide. Page 245 identifies the effects of the 13 parameters and labels them. These labels are reproduced on the screen, alongside the current value of the parameter. The currently selected parameter is highlighted in inverse video.

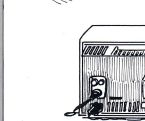
A table of 13 numbers is almost impossible to comprehend. Above the table the settings of the parameters are indicated by 12 paragraphs split into four clusters. They are grouped as the PI parameters, the PN parameters, the AA,AS & AR parameters and the ALA and ALD parameters. A description of the effects of changing these parameters is given in the User Guide.

A practical appreciation can be obtained by experimentation. A parameter to be changed is highlighted using the left and right arrow keys. The value is changed within its limits using the up and down arrow keys. Pressing the Return key will sound the envelope; when you are satisfied pressing the Escape key will return to the music editor. The current envelope specification will be saved and recalled with any tune.

Pressing F8 causes a printer dump to be performed. In the configuration given page 10 of memory — &A00 to &AFF — is assumed to be available for use. This is acceptable for disc users, tape users will have to use page 14 — &D00 to &DFF. Examining listing 2 shows a dummy RTS code has been inserted.

If you want to use this facility then the Remmed *Load command will have to be activated, to load into memory your own screen dump code; and the dummy RTS command removed. This can be omitted if screen dumps are not required. When you are ready to leave

THE



BBC

the system F9 will cause an orderly return to Basic.

The basis of the editor is a list of note codes held in memory. Each note requires two bytes to define its duration and pitch. These are held in memory in the reserved byte array labelled tune%, defined and initialised within PROC prepare. The only obscure parts of the preparation are the definition of an Oword area which will be used to obtain character definitions for the double height plotting routine.

Retrieved from memory

There is no legitimate method to obtain an envelope definition within the operating system. Consequently the envelope parameters have to be retrieved from memory into the envelope% array using Peek.

The first part of the main listing, as far as PROC MAIN contains various procedures concerned with screen operations. The most transportable procedure is PROC bighar, whose parameter identifies a character to be plotted on a screen in double height. Using this procedure mollifies the effect of being forced to work in 20 column mode.

Listing 1.

```
10 REM INT LOAD
20 REM EDITOR LOADER
30 REM FINTAN CULWIN
40 REM APRIL '85
50 MODE4
110VOUT25,248,16,28,18,16,184,128,128,48
110VOUT25,241,40,128,128,184,16,18,28,16
110VOUT25,242,16,28,18,16,184,121,128,48
110VOUT25,243,40,128,121,184,16,18,28,16
110VOUT25,244,16,18,16,16,184,128,128,48
110VOUT25,245,16,28,128,184,16,16,16,16
110VOUT25,246,16,18,16,16,184,121,128,48
110VOUT25,247,48,128,121,184,16,16,16,16
110VOUT25,248,16,18,16,184,60,72,40
110VOUT25,249,48,72,88,184,16,16,16,16
110VOUT25,250,16,16,16,16,184,69,72,40
110VOUT25,251,48,72,88,184,16,16,16,16
```

```
228VOUT3,252,8,8,8,56,68,72,112,8
238VOUT3,253,8,8,8,56,68,72,112,8
248ENVELOPE4,5,8,8,8,8,8,121,18,40,
-2,128,128
258FOR j=1 TO 18
260 FDB char = 248 TO 253
270 VDB char,32
280 NEXT char
290 VDB 17,18,18
300NEXT Line
310FOR pitch = 97 TO 177 STEP 8
320 SOUND 1,pitch,5
330NEXT pitch
340 PAGE=11980
350 W.18 PA.=>11980:PR.18
360 CHAIN ==
```


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AN EXPANDING

· SYSTEM ·

There is a complete range of peripherals available to CPC 664 users which plug directly into the built-in interfaces.

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Amstrad CPC 664

Amstrad, P.O. Box 462, Brentwood, Essex CM14 4EE

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HERE'S A colourful asteroids-style game for the Amstrad CPC-464. While using Mode 1 it manages to give a whole range of colours and provides Mode 0 size text printing on the screen using a Rom indirection. Get yourself a high score by shooting the eggs and aliens but watch the bonus. Quick shots will score well but be slow and the bonus will turn against you!

The game features 44 sprites of different sizes with up to 25 on the screen at any one time. These are controlled by a machine-code routine that can easily be adapted for your own purposes. In fact, most of the action is controlled by machine-code making the main Basic game loop very short and speedy.

The main program appears in listing 1 and may be typed in directly. It should be saved — with Goto 20000 — before running as any mistakes in the data may cause the system to crash. The machine-code is in five routines, three of which are listed so that you can use them in your own programs. The first one — listing 2 — is for wide printing mimicking mode 0 printing.

In fact, it will work in any mode with suitable changes to the final few bytes to reset the cursor position. It works by altering the high byte of the Rom indirection at &BDD5 using Poke so that instead of pointing to the Rom routine at &134A, it points to our routine at &A34A.

We can then use the usual Print command including the Print Using format. The colour of the printing is given by the pen mask — changing this can give striped writing or mixed colours. Note that the indirection supplies the screen position as a physical

PRESS Y FOR ANOTHER GO



MEN 1 BONUS 2445

AMSTRAD

Listing 1.

```

1000 REM ***** Asteroids *****
1010 REM * Mode 1 *****
1020 REM * Screen Size *****
1030 REM * Draw Screen *****
1040 REM * Draw Screen *****
1050 REM * Draw Screen *****
1060 REM * Draw Screen *****
1070 REM * Draw Screen *****
1080 REM * Draw Screen *****
1090 REM * Draw Screen *****
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1110 REM * Draw Screen *****
1120 REM * Draw Screen *****
1130 REM * Draw Screen *****
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1170 REM * Draw Screen *****
1180 REM * Draw Screen *****
1190 REM * Draw Screen *****
1200 REM * Draw Screen *****
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1280 REM * Draw Screen *****
1290 REM * Draw Screen *****
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1320 REM * Draw Screen *****
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1360 REM * Draw Screen *****
1370 REM * Draw Screen *****
1380 REM * Draw Screen *****
1390 REM * Draw Screen *****
1400 REM * Draw Screen *****
1410 REM * Draw Screen *****
1420 REM * Draw Screen *****
1430 REM * Draw Screen *****
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1470 REM * Draw Screen *****
1480 REM * Draw Screen *****
1490 REM * Draw Screen *****
1500 REM * Draw Screen *****
1510 REM * Draw Screen *****
1520 REM * Draw Screen *****
1530 REM * Draw Screen *****
1540 REM * Draw Screen *****
1550 REM * Draw Screen *****
1560 REM * Draw Screen *****
1570 REM * Draw Screen *****
1580 REM * Draw Screen *****
1590 REM * Draw Screen *****
1600 REM * Draw Screen *****
1610 REM * Draw Screen *****
1620 REM * Draw Screen *****
1630 REM * Draw Screen *****
1640 REM * Draw Screen *****
1650 REM * Draw Screen *****
1660 REM * Draw Screen *****
1670 REM * Draw Screen *****
1680 REM * Draw Screen *****
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1770 REM * Draw Screen *****
1780 REM * Draw Screen *****
1790 REM * Draw Screen *****
1800 REM * Draw Screen *****
1810 REM * Draw Screen *****
1820 REM * Draw Screen *****
1830 REM * Draw Screen *****
1840 REM * Draw Screen *****
1850 REM * Draw Screen *****
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1870 REM * Draw Screen *****
1880 REM * Draw Screen *****
1890 REM * Draw Screen *****
1900 REM * Draw Screen *****
1910 REM * Draw Screen *****
1920 REM * Draw Screen *****
1930 REM * Draw Screen *****
1940 REM * Draw Screen *****
1950 REM * Draw Screen *****
1960 REM * Draw Screen *****
1970 REM * Draw Screen *****
1980 REM * Draw Screen *****
1990 REM * Draw Screen *****
2000 GOTO 20000

```

```

2010 REM ***** Asteroids *****
2020 REM * Mode 1 *****
2030 REM * Screen Size *****
2040 REM * Draw Screen *****
2050 REM * Draw Screen *****
2060 REM * Draw Screen *****
2070 REM * Draw Screen *****
2080 REM * Draw Screen *****
2090 REM * Draw Screen *****
2100 REM * Draw Screen *****
2110 REM * Draw Screen *****
2120 REM * Draw Screen *****
2130 REM * Draw Screen *****
2140 REM * Draw Screen *****
2150 REM * Draw Screen *****
2160 REM * Draw Screen *****
2170 REM * Draw Screen *****
2180 REM * Draw Screen *****
2190 REM * Draw Screen *****
2200 REM * Draw Screen *****
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2220 REM * Draw Screen *****
2230 REM * Draw Screen *****
2240 REM * Draw Screen *****
2250 REM * Draw Screen *****
2260 REM * Draw Screen *****
2270 REM * Draw Screen *****
2280 REM * Draw Screen *****
2290 REM * Draw Screen *****
2300 REM * Draw Screen *****
2310 REM * Draw Screen *****
2320 REM * Draw Screen *****
2330 REM * Draw Screen *****
2340 REM * Draw Screen *****
2350 REM * Draw Screen *****
2360 REM * Draw Screen *****
2370 REM * Draw Screen *****
2380 REM * Draw Screen *****
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2700 REM * Draw Screen *****
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2760 REM * Draw Screen *****
2770 REM * Draw Screen *****
2780 REM * Draw Screen *****
2790 REM * Draw Screen *****
2800 REM * Draw Screen *****
2810 REM * Draw Screen *****
2820 REM * Draw Screen *****
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2860 REM * Draw Screen *****
2870 REM * Draw Screen *****
2880 REM * Draw Screen *****
2890 REM * Draw Screen *****
2900 REM * Draw Screen *****
2910 REM * Draw Screen *****
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2940 REM * Draw Screen *****
2950 REM * Draw Screen *****
2960 REM * Draw Screen *****
2970 REM * Draw Screen *****
2980 REM * Draw Screen *****
2990 REM * Draw Screen *****
3000 GOTO 20000

```

```

3010 REM ***** Asteroids *****
3020 REM * Mode 1 *****
3030 REM * Screen Size *****
3040 REM * Draw Screen *****
3050 REM * Draw Screen *****
3060 REM * Draw Screen *****
3070 REM * Draw Screen *****
3080 REM * Draw Screen *****
3090 REM * Draw Screen *****
3100 REM * Draw Screen *****
3110 REM * Draw Screen *****
3120 REM * Draw Screen *****
3130 REM * Draw Screen *****
3140 REM * Draw Screen *****
3150 REM * Draw Screen *****
3160 REM * Draw Screen *****
3170 REM * Draw Screen *****
3180 REM * Draw Screen *****
3190 REM * Draw Screen *****
3200 REM * Draw Screen *****
3210 REM * Draw Screen *****
3220 REM * Draw Screen *****
3230 REM * Draw Screen *****
3240 REM * Draw Screen *****
3250 REM * Draw Screen *****
3260 REM * Draw Screen *****
3270 REM * Draw Screen *****
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3380 REM * Draw Screen *****
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3870 REM * Draw Screen *****
3880 REM * Draw Screen *****
3890 REM * Draw Screen *****
3900 REM * Draw Screen *****
3910 REM * Draw Screen *****
3920 REM * Draw Screen *****
3930 REM * Draw Screen *****
3940 REM * Draw Screen *****
3950 REM * Draw Screen *****
3960 REM * Draw Screen *****
3970 REM * Draw Screen *****
3980 REM * Draw Screen *****
3990 REM * Draw Screen *****
4000 GOTO 20000

```

SPACE EGGS

PRESS Y FOR ANOTHER GO

MEN 1 BONUS 1795 ****110 HI 1000

Christopher Leigh presents a new version of a favourite shoot-'em-up using sprites in glorious colour.

The first byte of the shape data is the size of the sprite in quarters. The rest of the shape data comprises bytes made up in the same way as characters are plotted on the screen in Mode 1.

As already suggested, IMove only needs to be called once a game cycle to move everything. Printing of score and bonus is done once a second by calling the routine at line 200. All that remains is to read the keys, produce sound effects, check for collisions and keep the bullets firing.

For the sake of speed the last two requirements are covered by two routines tailored for this game. Collision checking is done by reading the collision flags of each sprite and by checking for identical positioning. The latter is only needed for a stationary sprite.

Eight bullets are allowed on screen at any time so as each is fired the one eight back must be erased. Key checking is left in Basic so that you can easily change the program to suit your fingers, and the speed can be changed using p% in 1070 and 4010.

Note that your subspace thrusters always work in the direction you are pointing so that once moving you need to turn round in order to slow down. Remember your hyper space dive is kaput so using it could well land you in the middle of one of those eggs or in the firing line of your own bullets. The faster you shoot the aliens the larger the bonus — if you take too long your bonus will become negative having a disastrous effect on your score!

Should you wish to start firing immediately without typing in the lengthy data, you should send £3 for a tape to C.J. Leigh, 12 The Bassetts, Cashes Green, Streou, Glos GL5 4SJ. Ask for Space Eggs and don't forget your name and address.

position — top left = 0, 0 — whilst the cursor must be reset to the logical position — top left = 1, 1 — hence the extra increment instructions.

The second and third routines control the sprites and are called using Resident System Extension (RSX) commands. Move and Erase must be preceded by the elongated colon — shift @ — and I'Erase must be followed by a comma and its parameter which is the address of the first byte of the move data for the sprite.

The screen is 80 bytes wide and the sprite routines divide it into 50 half lines high, so that each sprite unit is a quarter of a Mode 1 character. These routines can cope with sprites of any size and — with slight alterations — of any shape. All our sprites will be set in a square sprite shape definition, but since zero bytes are not written to the screen — making the sprite transparent — the sprite can be any shape within that framework.

As written the procedure allows full wrap-around, adjusting for sprites being partly off a screen edge. Again fairly simple alterations will allow sprites to bounce.

I'Erase simply erases a sprite and turns it

off. I'Move works by calculating the old sprite position and then writing it with an ink mask of zero to rub it out, then calculating the new position and writing with the ink mask given in the move data.

This ink mask can be set to produce pure colours or colour mixtures for a whole sprite. The new position is calculated by adding the speed components to the old position and then ensuring it is on the screen. The move data also includes the address of the shape data for a particular sprite and a collision byte. This collision byte is the last non zero byte read off the screen when writing the sprite. This allows us to know if it is on top of anything and also what it is a n top of.

The move data consists of nine bytes formatted thus: on/off flag, right position, down position, right speed, down speed, ink mask, shape address low, shape address high, collision byte. I'Move will, in fact, move every sprite, whose on/off flag is one, in the block of move data and the routine is stopped by a value of two. The shape data address can be altered to change the shape of a sprite during the game as is done to rotate your space ship.

Listing 2.

ORIGIN A24A	C5	PUSH RC
PUSH HL	D5	PUSH DE
PUSH AF	#A04	LD B,#04
CALL BC1A	AF	BYTE
CALL BC1A	C021	SLA C
POP AF	C002	JRNC #2
EX DE,HL	F0C0	OR A,CC
CALL BBAS	C021	SLA C
LD B,07		
LD C,(HL)		

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Tel: 01-3300101 Tlx: 28704 MMHVN G

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(continued from page 65)

0002	OR A,02		01	POP HL	
0630	OR A,03	other half of byte	23	INC HL	increment character byte
12	LD (DE),A	byte to screen	01	POP BC	increment row count
13	INC DE	next screen address	100E	32ND CARRY	
10EF	DIN2 BYTE	back for next pixel	01	POP HL	increment cursor position
01	POP DE	increment address	24	INC H	
05	PUSH HL	save matrix address	24	INC H	
210000	LD HL,000		24	INC H	
19	ADD HL,DE	next screen row	2C	INC L	reposition cursor
08	EX DE,HL	toggle in DE	007500	3F 0075	TEXT_SET_CURSOR

Listing 3.

		ORIGIN A400	FE20	CP 30		loff screen bottom?
010CA4	LOGON	LD BC,3MPTAB	0002	JR C,02		
210AA4		LD HL,BUFFER	0630	SUB 30		
00D1BC		CALL ECD1	0E3F	SRL A		divide by two
C9		RET	0002	JR NC,02		
00000000	BUFFER	DEFS 4	1620	LD 30		middle of line
16A4	JMPTAB	DEFW NMETAB	6F	LD L,A		
C3ECA4		JP ERASE	2600	LD H,00		prepare to multiply
C32BA4		JP MOVE	F1	POP AF		
40524153		DEFW "ERAS"	05	PUSH DE		
C5		DEFB "E"+00	29	ADD HL,HL		times two
404F56		DEFW "MOV"	29	ADD HL,HL		
C5		DEFB "E"+00	29	ADD HL,HL		
00		NOP	05	PUSH HL		sixteen times
00210AA5	MOVE	LD IX,A500	31	POP DE		
1049		JR CHKEND	29	ADD HL,HL		
21CA44	MEXSPR	LD HL,MASK+1	29	ADD HL,HL		times sixty four
3600		LD (HL),0	19	ADD HL,DE		times eighty
007E01		LD A,(IX+1)	31	POP DE		half line offset
000000		DEFS 3	19	ADD HL,DE		
C079A4		CALL WRISPR	16C0	LD B,C0		start of screen
21CA44		LD HL,MASK+1	5F	LD E,A		right position
007E05		LD A,(IX+1)	19	ADD HL,DE		screen address
77		LD (HL),A	D1	POP DE		data address
007E02		LD A,(IX+2)	3004	LD A,04		four lines a block
006A04		ADD A,(IX+4)	F3	PUSH AF		
F24A44		JP P,02	C5	PUSH BC		width parameters
C430		ADD 30	C5	PUSH HL		
FE20		CP 30	1A	BYTE		
0002		JR C,02	FE00	CP 00		
0630		SUB 30	200C	JR Z,ZERO		ignore zero bytes
007702		LD (IX+2),A	7C	LD A,(HL)		screen byte
007E01		LD A,(IX+1)	FE00	CP 00		check collision
006A03		LD A,(IX+3)	2003	JR Z,03		
F25A44		JP P,02	007700	LD (IX+0),A		collision flag
C450		ADD 50	1A	LD A,(DE)		sprite byte
FE50		CP 50	E0FF	MASK		open mask
0002		JR C,02	77	LD (HL),A		write screen
0630		SUB 30	12	ZERO		inc DE
007701		LD (IX+1),A	23	INC HL		next data
00360000		LD (IX+0),00	0D	INC HL		next screen byte
C079A4		CALL WRISPR	0D	SEC C		
110F00	MOVEON	LD DE,09	2000	JR NZ,ROOM		room for sprite
0019		ADD IX,DE	05	PUSH DE		
007E00	CHKEND	LD A,(IX+0)	AF	XOR A		
1F		RRA	115000	LD DE,0050		
0001		JR C,MEXSPR	ED52	SBC HL,DE		start of line
1F		RRA	D1	POP DE		
00F2		JR NC,MOVEON	10E0	32ND BYTE		next width byte
C9		RET	E1	POP HL		
F5	WRISPR	PUSH AF	010000	LD BC,0000		
0630		SUB 30	09	ADD HL,BC		next screen line
ED44		NEG	C1	POP BC		
4F		LD C,A	F1	POP AF		
006A02		LD H,(IX+2)	20	SEC A		four lines
005E04		LD E,(IX+4)	2002	JRNZ,LINE		
005607		LD D,(IX+7)	F1	POP AF		
1A		LD A,(DE)	E1	POP HL		
47		LD B,A	24	INC H		
4F		LD L,A	2D	SEC L		
13		INC DE	20A2	JRNZ,VERT		next vertical block
F1		POP AF	C9	RET		
05	VERT	PUSH HL	D5	ERASE		
F5		PUSH AF	21CA44	PUSH DE		data base address
35		PUSH DE	3600	LD (HL),00		clear pen mask
110F00		LD DE,0000	DE01	POP IX		
F5		PUSH AF	00360000	LD (IX+0),00		turn sprite off
7C		LD A,H	007E01	LD A,(IX+1)		
			C079A4	JP WRISPR		

RAMDISC



stored. The easiest way to save code to tape is with the `*t` command — see later.

All commands consist of an asterisk followed by a lower case letter, possibly followed by parameters.

`*l Load` — must be followed by a file name as a string up to 10 characters. If file name is null (" ") then the most recently saved file of the correct type — program or code — will be loaded. Options `Screen$` and `Code` are provided and are exactly the same as the tape versions. Data is not available.

`*s Save` — must be followed by a file name. The name may not be null. Options `Code`, `Screen$` and `Line` are provided and are the same as the tape versions. Data is not supported, but programs are saved with their variables. When a file under the same name — and type — is already on the disc, it is overwritten. The file is also moved to the top of the disc.

`*m Merge` — only works with program files, works the same as the tape version.

`*d Delete` — must be followed by a file name. You must specify `Code` to delete a code file. If the file name is null then the most recently saved file is deleted.

`*c Catalogue` — has no parameters. It prints a list of all files on the disc in exactly the same way as `Load` prints file names for the cassette system. It also prints the number of available bytes on the Ramdisc.

`*e Erase` — erases the whole Ramdisc.

`*t Tape` — must be given a file name. It saves all the files on the Ramdisc and the Ramdisc operating system to tape as a standard code file. This means that you can save and load a whole environment in one chunk of code. To load the file from Basic,

```
CLEAR 30000
or whatever value you are using,
LOAD " " CODE
and then
```

```
RANDOMIZE USR 63600
to switch the new commands on.
```

`*f Free` — prints the number of bytes free in the Basic system, i.e. below Ramtop. You may need this value when deciding where to place Ramtop. To get the total available space in the machine add this value and the value from catalogue (`*c`).

`*x Block delete` — deletes all Basic lines in the given range including the start and end lines. It is not strictly a Ramdos command,

but is a very short routine and should be useful.

In addition the `New` command has been redefined to print the new logo, and the `Clear` command now checks that the new value of `Ramtop` will not cause the Ramdisc to be overwritten. In cases where this would occur, the report "Out of memory" is given.

Error conditions and messages.

4 Out of memory — occurs when saving to the Ramdisc when there is not enough space for the new file. The area to be reclaimed if the file already exists is taken into account, so deleting the old copy will have no effect. Try moving `Ramtop` down by `Clearing`. If it occurs during loading or merging then there isn't enough space in the Basic area for the program.

8 End of file — occurs when loading, merging or deleting a file which does not exist — i.e. the end of directly had been found without finding the file. Sometimes occurs because you leave out the `Code` when loading bytes.

The value of `Ramtop` splits the available Ram into space for Basic and space for Ramdisc. A value of 30000 gives Basic reasonable space and leaves 34K for the Ramdisc. If you `Clear` too low Basic will reject your `Ramtop`, and if you `Clear` too high you will get the "Out of memory" error.

The method used for redefining commands consists of two pieces. First, a copy of the kernel of the Rom is made in Ram. The idea is that control will stay in the Ram, just calling Rom routines when required. There is one snag, the Rom routine check-end `IBEE` throws away its return address. To overcome this some code is inserted in the error routine in case new commands fail the syntax check.

Once this is done it is easy to define new commands, and I have left 25 bytes free in the jump table in case you want to add some. Disassemble from 64381, and move the instruction at 64422 down to accommodate your commands. If you don't like the default colours of white on black,

POKE 63714

with the attributes you want.

The main use of this system will probably be for small Basic programs under development, and for keeping utility programs handy. It also enables you to load and save screens very quickly, although you are limited to about four screens. There are other not so obvious uses though.

After I had written the program I still had the problem of generating the hex dump data statements. It is easy to print what looks like a program listing, but then you can't edit or run it.

I wrote a Basic program to poke the Data statements together with line numbers, line lengths and trailing Enter bytes into unused memory — just above `Ramtop` — then saved this as a code file on Ramdisc, poked around with the header to change it to a program, then loaded the program.

If you want to have other machine code in the machine you could put it in the printer buffer or UDG area if it is small enough. If it is too big you could put it just above `Ramtop`, and keep a careful watch on your Ramdisc size, or save a dummy chunk of code to reserve an area in the Ramdisc. ■

John Dawson completes his series on databases with a look at recent developments.

THE FIRST TWO articles in this series examined how the structure of different databases makes them more or less suitable for different purposes, how information can be extracted from the database and how insecure all of the BBC databases really are despite the password "protection" offered in some of the packages.

This month I'll conclude the series by writing about recent developments to the Merlin database, the design of the input forms in all the programs and the miscellaneous conclusions that come out of using a database program for some time.

Merlin database, the program from Merlin Computer products in Swansea, now has a sort program for ordering the records into a particular sequence on disc. The Report Writer language has also been finalised and you can construct quite sophisticated high level programs for taking information from a file, manipulating it — by adding VAT to the price of an item in a stock list for example — and then printing the result — as an invoice — or by writing the result of the calculation back to the same, or another field in the record.

The command set

Figure 1 shows two of the sample Report Writer programs given names and telephone numbers in a neat, tabulated format in which the tab stops are set within the program. Commands must be preceded by a colon, labels — for Repeat, Goto and Goto purposes — by a full stop and remarks by an asterisk.

The second example will extract data from the Inv Value, VAT%, Discount and Payment fields and write back to the record the values of Net Inv — net invoice — and Acc Bal — account balance. A label printing program is supplied that will print as many labels across the page as you need — Stardatabase is the other database that will print labels more than one wide.

The command set for the Report Writer program is as follows:

```
ADD a record      DISC (ON/OFF)
FGST S(x)        END FORM feed to
printer          FINPUT (F(x), S(x))
GET S(x)         GOSUB label
GOTO label       IF condition THEN
INFILE "filename" INPUT (F(x), S(x))
MOVE (F(x),      OUTFILE "filename"
S(x)FIELD)      PRINTER (ON/OFF)
PTR Fix         REPEAT
READ a record
RETURN from a    SCREEN (ON/OFF)
subroutine       TRUNCATE (ON/OFF)
STLEN number
UNTIL condition
WRITE a record back to the database
```

Arithmetic and logical operators and a subset of Basic mathematical functions such as SQR, ABS and INT. Many of the commands are similar to Basic instructions and it shouldn't prove difficult to use the Report Writer provided that it is adequately backed up by a good instruction manual.

All the programs use screen Mode 7 for entering information. Three of the databases

DATA

overcome the limitations of the Mode 7 format — 40 characters wide by 25 lines deep — by offering either multiple input screens — Acornsoft and the Merlin database — or a large input "card" over which the screen travels like a window — Datagem.

Solutions to problems

Figure 2 illustrates the different solutions to the problem of displaying a large record on a small screen. The Acornsoft database offers up to three screens on which you can set up a maximum of 32 fields. A field may be up to 240 characters long and words will be broken at the end of each line if you choose a field length in excess of 40 characters minus the length of the field title — maximum seven characters.

The Merlin database program allows you to allocate up to four screens for each record and

the appropriate screen will be shown on the VDU as you enter information into a record. In other words the program will place the cursor at the start of each field in numerical order which may mean jumping from screen one to screen three, screen two and back to screen one if that is the convenient or easy way for you to enter data. Stardatabase is limited to a single screen of 920 characters and long field titles will encroach even further on to the amount of data you can store in a single record.

Datagem will let you set up a field that is as wide as the input card. A field must be contained on one line but, like Stardatabase and the Merlin database, Datagem allows you to place more than one field and the associated field title on one line.

The Acornsoft database differs from the other three programs in that the input form requires each field title to start at the left

Figure 1.

```

*
*      CALCULATION AND WRITE BACK REPORT
*      REPORT SOURCE LISTING REP3
*
:SCREEN ON :PRINTER ON
:REPEAT: F(0)=0: F(2)=0
:READ
:MOVE F(0), NET INV: MOVE F(2), ACC BAL
:MOVE INV VAL, F(1)
:MOVE VAT, F(3)
:MOVE PAYMENT, F(4)
:MOVE DISC, F(5)
: F(0)=F(1)*(1+(F(3)/100))*((100-F(5))/100)
: F(2)=F(2)-F(4)+F(0)
:MOVE F(0), NET INV: MOVE F(2), ACC BAL
:WRITE
*
*      NET INV...      ACC BAL...
*
:UNTIL EOF
*
* NOTE THE USE OF THE WRITE COMMAND TO UPDATE THE NET INVOICE AND ACCOUNT
* BALANCE VALUES.
* NOTE ALSO THAT THE USE OF THE WRITE COMMAND DICTATES THAT THE DATABASE
* MUST BE RESTRUCTURED BEFORE FURTHER EDITING CAN TAKE PLACE.
*
*      EXAMPLE OF SIMPLE TABULATION REPORT
*
:SCREEN ON :PRINTER ON
:REPEAT
:  No.      Name      TEL      Inits      DATE
:REPEAT : READ : F(0)=F(0)+1
: F(0) 06 : $Name.....$TEL$ : $Inits$ : $DATE$ : $CORN$.....
:UNTIL LINE > 2000 EOF
:FORM UNTIL EOF
*
* NOTE THE USE OF A '*' AS A REM STATEMENT. I.E. ANY TEXT PRECEDED BY AN
* ASTERISK IN COLUMN 1, WILL BE IGNORED BY THE REPORT WRITER ON PRINTOUT.
* DO NOT USE A RETURN MARKER ALONE IN A LINE UNLESS YOU INTEND THAT A LINE
* FEED SHOULD BE SENT TO THE PRINTER.
*
* USE '*' IN COLUMN 1 TO SEPARATE GROUPS OF PROGRAM COMMANDS OR TEXT ON
* SCREEN WHEN MORE READABILITY IS WANTED
*
* ALWAYS INSERT A RETURN AT THE END OF EACH LINE. IF WORD WRAP OCCURS
* GO BACK AND INSERT THE RETURN ON THE LINE WILL BE OVERPRINTED.
* I.E. NO LINE FEED COMMAND IS SENT BY WORD WRAPPED TEXT. ALTERNATELY
* IF YOU NEED PRINTOUT LONGER THAN 80 COLUMNS WORD WRAPPED TEXT WILL
* PRODUCE IT.

```


SES

margin. The result of the more flexible approach taken by the more expensive programs is that you can simulate an existing paper record, with which people may be familiar already.

Despite the simple input capability of the Acornsoft database it is effective and easy to use. When you remember the limitations of View in terms of using long fields as "macros", this database offers all you will need for storing names, addresses and other non-textual data.

Stardatabase treats the field with the lowest ASCII code as the keyfield. This means that a field identified by the field tag Address1 has a lower ASCII value than a field tag Name or Address2. Figures come before alpha characters — upper and lower case letters — in the ASCII table and you can force the program to treat the Name field tag as the keyfield by calling it OName.

Using easily identifiable field names is important because Stardatabase expects you to know the field name — not the field title displayed on the screen — when you set up a search pattern or a sort list.

In contrast, Datagem permits you to search or sort on any field by specifying the number of the field in the search line. The following line will search for a named person "George Sanderson" in field number one:

F1 = "George Sanderson"

If one or more records are found in which "George Sanderson" is the string of characters in F1, markers identifying the records will be placed in the search level that you have selected. You can search for an exact match or something that approximates to what you are looking for in one or all the fields in the database using the search line:

FE = "Eandert"

where the left hand FE searches all the fields and the right hand expression will find the string "ander" in Mander, Sanderson, Anderson, Landerfield and so on. Datagem has the most powerful search facilities of all the databases I have examined and while Datagem is not the speediest database when it is actually calculating and computing, it gains heavily in terms of the time it will take you to formulate your search and carry it out.

Searching a record set

In other words the design of Datagem, far from perfect as it is, more than makes up for its comparatively leisurely performance in this area. Curiously, the Acornsoft database seems to me to be the next most useful program in terms of ease of searching a set of records. There is no multiple level search facility in the Acornsoft program but the fuzzy search facilities are a good match for those in Datagem. Sx makes you carry out serial searches, progressively refining a subset of records from the main database, until you arrive at the

specification that you require.

There is no real disadvantage in this method but Sx has been so precisely designed that the repeated operations become tedious. Remember that this is the database that I have chosen for routine use at work because it provides the optimum performance for the tasks that I wish to have done on the BBC computer.

I do wish, however, that the designer of Sx had studied the humans who use his program. In their sloppy way they want to simply find someone or something as quickly as possible with as few keystrokes as possible.

Having to go to the Search sub-menu, clear the current subset to zero records, decide which field the person or object will occur in, remember the names of the fields without being able to display them on screen — was it Key or Keywords or Keyword — carry out the search, return to the main menu and select browse or amend mode before finally displaying the required information is unnecessarily complicated.

Datagem can also export data to View and Wordwise but if you want to insert the name of a book, a sentence or some other information that may vary in length into a line of text I think you would have to spoon load the completed printout to disc and then load it back into View in order to reformat the text before it could be printed properly.

Datagem is a complete package which contains little information about the possibilities of accessing data in a database using any program other than the facilities in the program Rom.

The Merlin database has a sophisticated report writing package available on disc and this method of producing software — core program in Rom and utilities and extensions on disc — seems to offer a very good combination. The Report Writer section of the program is new and will take some time to access in depth.

Nevertheless, if you need to handle paragraphs of text in a card index type of database, and if you need to set up routine searches that lead to predetermined and complex reports then the Merlin database may be just what you are looking for. Certainly none of the others will fill these needs as well.

Sx has several attractive features. The program is supplied with information about a

large number of very useful procedures and "Star" calls for accessing the data in a Sx file. At the same time you should be aware that the Basic software supplied with the Sx chip is not error free.

If you try to add a page header to a report form from disc you are rewarded with a persistent error message. Other combinations of circumstances cause the utility software to hang up, but at least it is written in common or garden Basic and you can have a crack at correcting it, or modifying it to your particular needs.

Set against that, the Report Writer language for the Merlin package is compiled and enables you to produce a reporting program that cannot be easily deciphered by users who purchase a system from you.

Datagem has the best financial facilities of all the packages and Sx has potentially the worst because it handles all numbers as strings, rather than integers or real numbers, and, consequently, has no data validation. Additionally, Sx won't even search on the full six figures needed to describe a unique data in the twentieth century.

Data manipulation

You will need to read the Datagem manual carefully to appreciate the potential that it has for sophisticated numerical data manipulation. You will need to read the Datagem manual carefully to get much information from it. Written by the author of the program and one other person, it is a masterpiece of compact information leading to subtle confusion.

In all the discussion about the expensive systems it is very easy to overlook the cheap but capable Acornsoft package; probably for just that reason — it's cheap. If you can cope with seven letter field titles, a very slow sort function, the limitations of data export to View — shared with other database programs — and the obvious problems of swapping program and data discs if you have only one disc drive, then the Acornsoft program offers stunningly good value for money.

The data on a disc is organised in such a way as to make it accessible to Basic programs, the search facilities are good, the manual is far more helpful than those supplied with the View wordprocessor and it's a pleasant and effective package to use.

Figure 2. Datagem — Data input card.

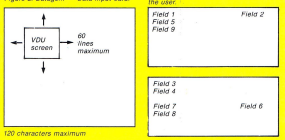


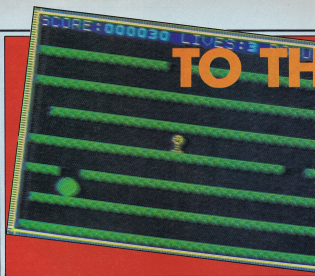
Figure 2a. Merlin DataScribe database. Multiple input screens with fields placed in the order of input most convenient to the user.

TO THE TOP is a game for the 48K Spectrum, featuring smooth animated sprite graphics, music, continuous sound, and a high score table. The object of the game is to move your man to the top-right hand side of the screen as quickly as possible, guiding him through the holes in the moving platforms which become faster the higher he gets.

However, he is not alone. To accompany him are various moving objects whose touch is lethal. On the first screen, there is only a rotating ball — which moves down the screen by falling through the platforms — to contend with but, on further levels, he is joined by several other characters, including a Pacman, a space invader and a beefburger in baps. These all move across the screen from left to right, gradually working their way down.

In order to speed you up a bit, there is a bonus which decreases as time passes. What left of your bonus on completion of a screen is added to your score. If you can ever complete the first seven levels with your three lives — surely this isn't possible? — a congratulatory tune is played, you get an extra life, and the game goes back to the first screen, with faster moving platforms.

The control keys for the game are given in the instructions in the game, but note that, to



TOP

SCORE: 000948 LIVES: 3 BONUS: 930

Listing 2

```

100:FOR a=27000 TO 32300 STEP 5
110:PRINT a;"":LET c=a:FOR
    b=a TO 1
120:INPUT n:IF n=0 OR n>255 TH
    EN BEEP :GOTO 130
130:POKE a+b;n:PRINT TAB 6-b*4
    PEEK (a+b):LET c=c+PEEK (a+b)
    NEXT b
140:INPUT n:IF n=0 THEN BEEP
    :GOTO 100:PRINT "GO TO 110"
150:PRINT TAB 25;"(C)1987: NEX

```

Listing 2

```

100 FOR a=27000 TO 32000 STEP 5
110 PRINT a;" "; LET c=a; FOR b
    b=0 TO 4
120 INPUT n: IF n=0 OR n>255 TH
EN BEEP .5,10: GO TO 120
130 POKE a+b,n: PRINT TAB 6+b+4
    PEEK (a+b): LET (c+c+PEEK (a+b)
    NEXT b
140 INPUT n: IF n=1: THEN BEEP
    .5,10: PRINT GO TO 110
150 PRINT TAB 20;"(c)"; NEX

```

Listing 3.

```
10:PAPER 0: INK 0: BORDER 0: C  
LEARN 25000: PRINT PAPER 1: INK 7  
: BRIGHT 1: FLASH 1: AT 11,4:"TO  
THE TOP" IS LOADING"  
20: LOAD ""CODE : RANDOMIZE USR  
20397
```

To enter the game, first type in the machine-code loader in listing 23, with which you can enter all the machine code in listing 1. With listing 1, in the left-hand column are the memory address, and in the right hand column are the checksum values. Enter the five codes in between, and then the checksum value for that line.

When you have entered all the 5400 bytes of machine code, and are satisfied that all is correct, type New after entering
CLEAR 26999

to get rid of the Basic, whilst retaining the machine code. Then enter the program in listing 3, and save the two parts of the game using:

SAVE "TO THE TOP" LINE 0:
SAVE "C" CODE 27000,5400

Verify, and you are then ready to play.

[illegible]

(continued on next page)

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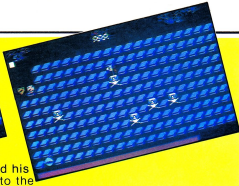
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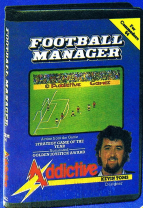
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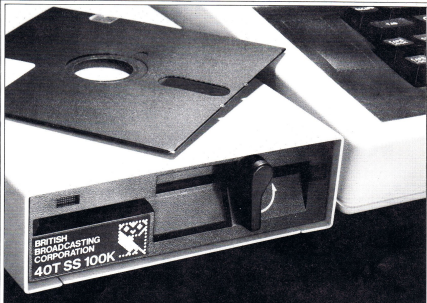
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(YCT)

SWITCH ON your 64; the screen memory starts at 1024 — hex 0400 — so that, for example, POKE 1024,1

puts an A in the extreme top-left corner — older 64s may need colour Ram to be poked too. Right? For most purposes, this is assumed to be a fixed feature of the 64.

What's less well known is that the screen can be repositioned through most of the machine's 64K of Ram. The diagram shows the normal situation, with about 39000 bytes of Basic positioned between the top of the screen — \$08000 — and Rom at \$A000. But we can move the screen, in minimum steps of \$0400, anywhere in memory.

Screens under Rom

Some locations aren't suitable, as machine-language programmers will appreciate — for example the zero-page, at the very start of memory, cannot be used as a normal screen. My example puts screens under Rom, partly because many programmers don't know how to

MOVING SC

Rae West explains a routine which will switch between screens for animation or Help pages.

use this area (machine language is usually needed), so it's usually free, and partly to avoid the complication of altering Basic pointers to prevent programs overlapping the screen area.

"Moving the screen" — what does this mean? Nothing to do with the TV! — we want commands like Print and keys like CLR to

work normally, but to have freedom to alter the actual position in memory that screen information is stored. If we do the job properly, most things will be unaltered, but Pokes to screen, if used, will be different — the addresses will be much larger than usual since the screen Ram is higher up.

Before we continue, it makes sense to ask why anyone should want to move the screen around. In fact, there are several tricks we can perform with this method, which are impossible otherwise:

- We can switch between screens at will. For example, a Help screen might be permanently set up; a keypress would allow instantaneous switching between conventional processing and such a screen.
- Animation is another possibility: there's room for 16 screens in Bank 1, plus 12K of Basic below them, enough for attractive animation of the piston-engine demo type.
- Screens of user-defined graphics and normal characters can be alternated.

Using interrupt techniques, we can mix screens on the same display.

Attractive patterns

My demonstration program puts four user-defined characters in Ram; these are designed to fit together to produce attractive patterns. The program uses two screens — Apple users will know the kind of thing — Apple has two alternate screens. It fills one screen, displays it, then repeats with the other, so there's no delay while one pattern is overwritten with the next. The result is quite impressive.

Vic-II is the key to the action, and it's necessary to get several things right, which is why the technique isn't too simple. As the diagram shows, Vic-II can be programmed to process only a quarter of the 64's memory at one time. All the character definition information — i.e. patterns of 8 by 8 dots — and the screen Ram, and sprite information must be stored within this 16K. The only exception is the 64's Rom character set, which is wired up to override this requirement.

Moving the screen

So, to move the screen under Rom, we must (i) Set Vic-II to bank 2 or 3; (ii) Set Vic-II to read the character set we want; and (iii) ensure Basic writes to our new screen. This last item

Figure 1.

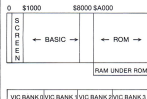


Table 1.

Usable Character Definition and Screen Combinations

Vic Bank 0: selected with POKE 56576,(PEEK(56576)AND 252) OR 3 (DEFAULT)
(usual value is 151)

Start of Screen Memory	POKE 648** with	Start of Graphics Character Memory							
		ROM char set							
		U.CASE 2048	L.CASE 4096	6144	8291* 8291	10240	12288	14336	
POKE 53272 with:									
1024	4	19	21	23	25	27	29	31	
2048	8	35	37	39	41	43	45	47	
3072	12	51	53	55	57	59	61	63	
The screen cannot be placed at 4096-8191, as the Vic sees character ROM here.									
8192	32	131	133	135	137	139	141	143	
9216	36	147	149	151	153	155	157	159	
10240	40	163	165	167	169	171	173	175	
11264	44	179	181	183	185	187	189	191	
12288	48	195	197	199	201	203	205	207	
13312	52	211	213	215	217	219	221	223	
14336	56	227	229	231	233	235	237	239	
15360	60	243	245	247	249	251	253	255	

*Starred columns correspond to bit-map graphics.

**Not needed with bit-map graphics.

Vic Bank 1: selected with POKE 56576,(PEEK(56576)AND 252) OR 2
(usual value is 150)

Start of Screen Memory	POKE 648 with	Start of Graphics Character Memory							
		16384*	18432	20480	22528	24576*	26624	28672	30720
		POKE 53272 with:							
16384	84	1	3	5	7	9	11	13	15
17408	88	17	19	21	23	25	27	29	31
18432	92	33	35	37	39	41	43	45	47
19456	96	49	51	53	55	57	59	61	63
20480	100	65	67	69	71	73	75	77	79
21504	84	81	83	85	87	89	91	93	95
22528	88	97	99	101	103	105	107	109	111
23552	92	113	115	117	119	121	123	125	127
24576	96	129	131	133	135	137	139	141	143
25600	100	145	147	149	151	153	155	157	159
26624	104	161	163	165	167	169	171	173	175
27648	108	177	179	181	183	185	187	189	191
28672	112	193	195	197	199	201	203	205	207
29696	116	209	211	213	215	217	219	221	223
30720	120	225	227	229	231	233	235	237	239
31744	124	241	243	245	247	249	251	253	255

REENS



relies on location 648.

PRINT PEEK (648)

usually returns 4, showing the screen starts at \$0400.

Memory arrangements

Table 1 — which, so far as I know, hasn't been printed before — summarises the 64's screen memory arrangements. You should be able to see from it that my example puts character definitions from 49152 onwards, and uses two screens, starting at 50176 and 51200, which it switches between. While Print takes place, the "wrong" value of 648 is used, which makes the 64 display the alternative screen.

Incidentally, sprites are usable with this method; sprite pointers are hidden away just above the screen, so when a screen is moved these pointers shift too. One final word: when experimenting, Stop-Restore won't change location 648. So if your cursor seems to have vanished, try

POKE 648,4

to return to normal.

Rae West has written a 600 page reference book, *Programming the Commodore 64*, recently published by Level Ltd. It is obtainable from booksellers or by mail from Biblios Distribution, Star Road, Partridge Green, Nr Horsham, W. Sussex at £14.90 plus £1 post.

Demo program.

```

0 REM *** 'YOUR COMPUTER' ~ DEMONSTRATION OF TWO C64 SCREENS ***
10 POKE 56576,148 : REM VIC BANK 3
20 S$="@ABC" : REM 4 CHARACTERS
30 FOR J=49152 TO 49183: READ X: POKE J,X: NEXT: REM SET UP USER DEFINED CHARS
40 DATA 36,36,255,0,0,255,36,36
50 DATA 36,36,231,36,36,231,36,36
60 DATA 36,18,9,132,66,33,144,72
70 DATA 36,72,144,33,66,132,9,18
99 REM **** NOW WE DISPLAY ONE SCREEN, WHILE WRITING TO THE OTHER:- ****
100 GOSUB 1000: POKE 53272,17: POKE 648,200: REM ONE SCREEN ...
110 GOSUB 1000: POKE 53272,33: POKE 648,196: REM ... OTHER SCREEN!
120 GOTO 100
999 REM **** MAKE A RANDOM STRING OF LENGTH 9 FROM THE 4 CHARACTERS:- ****
1000 X$="": FOR J=1 TO 9: L=RND(1)*4+1
1010 X$=X$+MID$(S$,L,1): NEXT
1020 PRINT "X$": FOR J=1 TO 111: PRINT X$: NEXT
1030 RETURN
    
```

Vic Bank 2: selected with POKE 56576,(PEEK(56576)AND 252) OR 1
(usual value is 149)

Start of Graphics Character Memory									
Start of Screen Memory	POKE 648 with	ROM char set U.CASE L.CASE							
		32768	34816	36864	38912	40960	43008	45056	47104
POKE 53272 with:									
32768	128	1	3	5	7	9	11	13	15
33792	132	17	19	21	23	25	27	29	31
34816	136	33	35	37	39	41	43	45	47
35840	140	49	51	53	55	57	59	61	63

The screen cannot be placed at 36864-40959, as the Vic sees character Rom here. Above this point in this bank, Ram and Basic Rom co-exist in the memory map; the Vic "sees" the Ram, not the Rom, but the routines that perform screen operations need to read from screen Ram; they can't do so, in this region, without first switching out the Roms and switching in the Ram. This isn't normally done — it can only be done if Basic is not in use. So this area cannot effectively be used for screen Ram. Note, however, that it can be used to store character definitions, since these don't need to be read back, as the Vic chip will read these from Ram while the 6510 reads instructions from the parallel Rom containing Basic.

Vic Bank 3: selected with POKE 56576,(PEEK(56576)AND 252)
(usual value is 148)

Note: only the region of memory \$C000-\$CFFF (49152-53247) can be used as screen RAM: see the comments above.

Start of Graphics Character Memory									
Start of Screen Memory	POKE 648 with	Caution: IO chips							
		49152	51200	53248	55296	57344	59392	61440	63488
POKE 53272 with:									
49152	192	1	3	5	7	9	11	13	15
50176	196	17	19	21	23	25	27	29	31
51200	200	33	35	37	39	41	43	45	47
52224	204	49	51	53	55	57	59	61	63

To use these tables:

(i) To determine screen start and graphics definition start, Peek contents of 648 and 53272, then refer to the table. Example: when 648 contains 140 and 53272 contains 53, screen Ram starts at 35840 and Rom characters at 36864. Bank 2 is in use; this can be deduced from the position of screen Ram given in 648.

(ii) To set screenstart and graphics definitions, Poke all three parameters, unless already set. Example: POKE 56576, (PEEK(56576)AND 252)OR 2: POKE 648,120: POKE 53272,252. Select bank 1, puts screen at 30720 and chooses user-definable characters at 28672. In Basic, POKE 5628672(256: CLR or POKE 56,112: CLR lowers the top of Basic to protect the definitions and screen.

(iii) To move the normal character definitions, use POKE 56333,127: POKE 1,51 followed by a loop to transfer 53248-57343 (or a subset) to the new position, then POKE 1,55: POKE 56333,129. All this must be in program mode. This method is easier than defining all the characters from scratch.

(iv) The Vic-II's bank-switching forces both screen and character definitions to coexist in the same quarter of the 64's memory map. It's perfectly OK to start the screen up at 49152, and store character definitions in the Ram from 61440, say, taking nothing from Basic. Many character sets can be stored simultaneously, in fact.

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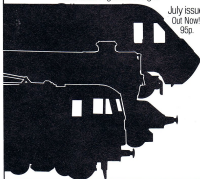
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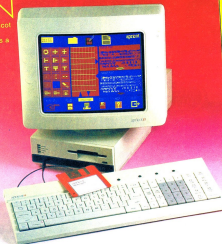
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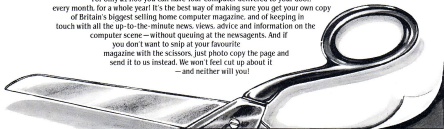
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A photograph of a 16x16 dot matrix display on a circuit board. The display shows a grid of dots forming a pattern that resembles a stylized 'X' or a cross. To the right of the display, there is a label 'SHEET' and a small arrow pointing to the right. Below the display, there are labels 'SCORE' and 'TIME' followed by some numbers.

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or more blocks in one straight line, you get a bonus of 10xtime left, and when time reaches zero, you move on to the next sheet. In total there are four different sheets. When you are out of lives, the game ends. You can also abort the game by pressing Break. If the high-score is beaten, the computer will ask you to enter your name - don't forget to press Newline. Answering the question "another game?" with N will bring you back to the title screen.

If you don't feel up to the task of typing in the listings, or you cannot manage to get the program to work — not very likely — the game is available on a fresh cassette tape for f10 — Dutch guilders, or £3 — from Miquel Van Smoorenburg, 20 Baljuwstraat, 2461 st Tee-Aar, Holland.

they dump on next page

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COMMODORE 64, BBC AND SPECTRUM

Figure 1. CBM-64

```

3 REM  HEX LOADER FOR CBM 64  FTS:1
4 REM
10 FOR I=6550 TO 727:MEMH=POKE(I,1):I=I+4
20 NEXT I:IF T=0 THEN GOTO 100
30 INPUT "ENTER IN: "I:IF I=0 THEN GOTO 100
40 DATA 153,187,169,132,187,153,194
50 DATA 133,185,169,132,183,169,200
60 DATA 133,187,169,2,133,188,169,56
70 DATA 133,251,169,199,132,252,169,251
80 DATA 162,231,169,252,169,251,255,36
90 DATA 65,255,169,65,79,65,66
100 SAVE I:END=END+5
110 INPUT "START ADDRESS: "A
120 IF (ASCII(A) < 48) THEN GOTO 140
130 INPUT "END ADDRESS: "B
140 PRINT "PRINT ADDRESS RANGE: "A;"TO: "B
150 T=(B-A+27)/65:PRINT:INPUT D
160 IF B="END" THEN GOTO 200
170 IF LEN(D)=6 THEN GOTO 190
180 PRINT "INVALID ADDRESS"
190 FOR I=B TO T:Z=Z+1:Z=Z*65+D+1
200 GOSUB 200:IF I=Z THEN GOTO 200

```

[illegible]

THE PROGRAMS given here will enable Spectrum, BBC, and CBM-64 owners to download via Your Computer's Telsoft service. Each month for each machine we transmit at least one — and usually two — of the main programs appearing in the current issue. Also available is the full user to user communications program, Dialsoft.

So far OE LTD's Telemod 2 and the VTX 5000 modems have been tested with the BBC and Spectrum but the service also works with

```

800 SYS 650 (CRASHES) 34
810 PRINT PRINT "TO SYS:LOAD CODE ="
815 PRINT PRINT "LOAD" C$"D:\LOAD"
820 PRINT C$ " ] " RETURN
825 PRINT PRINT "THEN TYPE 'MENU'"
830 PRINT " RETURN"
835 PRINT PRINT "TO RUN THE PROGRAM"
840 PRINT " SYS 31000 (RETURN)"
850 PRINT PRINT PRINT "ENTER DATA"
860 PRINT PRINT "2 PRINT DATA"
870 PRINT PRINT "3 END"
880 PRINT " THEN TYPE 'END'"
890 PRINT " THEN TYPE 'END'"
900 PRINT " THEN TYPE 'END'"
910 PRINT " THEN TYPE 'END'"
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990 PRINT " THEN TYPE 'END'"

```

Figure 2. CBM-8.

51000	2	40000	21000	30000	302	514
51010	2	40000	21000	30000	302	514
51016	2	40000	21000	30000	302	514
51024	2	40000	21000	30000	302	514
51032	2	40000	21000	30000	302	514
51040	2	40000	21000	30000	302	514
51048	2	40000	21000	30000	302	514
51056	2	40000	21000	30000	302	514
51064	2	40000	21000	30000	302	514
51072	2	40000	21000	30000	302	514
51080	2	40000	21000	30000	302	514
51088	2	40000	21000	30000	302	514
51096	2	40000	21000	30000	302	514
51104	2	40000	21000	30000	302	514
51112	2	40000	21000	30000	302	514
51120	2	40000	21000	30000	302	514
51128	2	40000	21000	30000	302	514
51136	2	40000	21000	30000	302	514
51144	2	40000	21000	30000	302	514
51152	2	40000	21000	30000	302	514
51160	2	40000	21000	30000	302	514
51168	2	40000	21000	30000	302	514
51176	2	40000	21000	30000	302	514
51184	2	40000	21000	30000	302	514
51192	2	40000	21000	30000	302	514
51200	2	40000	21000	30000	302	514
51208	2	40000	21000	30000	302	514
51216	2	40000	21000	30000	302	514
51224	2	40000	21000	30000	302	514
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51248	2	40000	21000	30000	302	514
51256	2	40000	21000	30000	302	514
51264	2	40000	21000	30000	302	514
51272	2	40000	21000	30000	302	514
51280	2	40000	21000	30000	302	514
51288	2	40000	21000	30000	302	514
51296	2	40000	21000	30000	302	514
51304	2	40000	21000	30000	302	514
51312	2	40000	21000	30000	302	514
51320	2	40000	21000	30000	302	514
51328	2	40000	21000	30000	302	514
51336	2	40000	21000	30000	302	514
51344	2	40000	21000	30000	302	514
51352	2	40000	21000	30000	302	514
51360	2	40000	21000	30000	302	514
51368	2	40000	21000	30000	302	514
51376	2	40000	21000	30000	302	514
51384	2	40000	21000	30000	302	514
51392	2	40000	21000	30000	302	514
51400	2	40000	21000	30000	302	514
51408	2	40000	21000	30000	302	514
51416	2	40000	21000	30000	302	514
51424	2	40000	21000	30000	302	514
51432	2	40000	21000	30000	302	514
51440	2	40000	21000	30000	302	514
51448	2	40000	21000	30000	302	514
51456	2	40000	21000	30000	302	514
51464	2	40000	21000	30000	302	514
51472	2	40000	21000	30000	302	514
51480	2	40000	21000	30000	302	514

[illegible][illegible]

SPACE JUNK

HERE is a reminder of the loading and game instructions for Space Junk.

Insert cassette, press Shift and Run/Stop and start your cassette recorder. Loading time is about two minutes. Put your joystick into Port 2.

Can you retrieve all 32 satellites by mastering control of your ship, which can move up, down, left and right and can also fire bullets?

However, beware of the four yellow junkies which patrol the skies. Unless you can work out how to destroy them you're in trouble! To help you there's a radar at the top of the screen which will pinpoint the junkies and any miscellaneous junk which appears from

time to time and can be retrieved for bonus points.

After every two sheets you'll get an extra life and an attempt at the challenge stage. Here you have 99 units of time to turn the four junkies into stormer — if you succeed you'll get 8000 points! Below your score is shown the number of satellites left to collect, together with the number of lives left.

Pressing F7 will freeze the game and pressing the Space-Bar will restart it. Tape copies of the program are available for £3.25 from Nalin Sharma, 35 Kitchener Road, Walthamstow, London E17 4LJ.

At last, 80,000 characters after blast off, the good ship Space Junk reaches its final destination. Nalin Sharma explains.



7328	++89101020202020	194	7446	0404040404040404	820	7564	0404040404040404	820	7682	0404040404040404	820	7800	0404040404040404	820	7918	0404040404040404	820
7329	0404040404040404	820	7447	0404040404040404	820	7565	0404040404040404	820	7683	0404040404040404	820	7801	0404040404040404	820	7919	0404040404040404	820
7330	0404040404040404	820	7448	0404040404040404	820	7566	0404040404040404	820	7684	0404040404040404	820	7802	0404040404040404	820	7920	0404040404040404	820
7331	0404040404040404	820	7449	0404040404040404	820	7567	0404040404040404	820	7685	0404040404040404	820	7803	0404040404040404	820	7921	0404040404040404	820
7332	0404040404040404	820	7450	0404040404040404	820	7568	0404040404040404	820	7686	0404040404040404	820	7804	0404040404040404	820	7922	0404040404040404	820
7333	0404040404040404	820	7451	0404040404040404	820	7569	0404040404040404	820	7687	0404040404040404	820	7805	0404040404040404	820	7923	0404040404040404	820
7334	0404040404040404	820	7452	0404040404040404	820	7570	0404040404040404	820	7688	0404040404040404	820	7806	0404040404040404	820	7924	0404040404040404	820
7335	0404040404040404	820	7453	0404040404040404	820	7571	0404040404040404	820	7689	0404040404040404	820	7807	0404040404040404	820	7925	0404040404040404	820
7336	0404040404040404	820	7454	0404040404040404	820	7572	0404040404040404	820	7690	0404040404040404	820	7808	0404040404040404	820	7926	0404040404040404	820
7337	0404040404040404	820	7455	0404040404040404	820	7573	0404040404040404	820	7691	0404040404040404	820	7809	0404040404040404	820	7927	0404040404040404	820
7338	0404040404040404	820	7456	0404040404040404	820	7574	0404040404040404	820	7692	0404040404040404	820	7810	0404040404040404	820	7928	0404040404040404	820
7339	0404040404040404	820	7457	0404040404040404	820	7575	0404040404040404	820	7693	0404040404040404	820	7811	0404040404040404	820	7929	0404040404040404	820
7340	0404040404040404	820	7458	0404040404040404	820	7576	0404040404040404	820	7694	0404040404040404	820	7812	0404040404040404	820	7930	0404040404040404	820
7341	0404040404040404	820	7459	0404040404040404	820	7577	0404040404040404	820	7695	0404040404040404	820	7813	0404040404040404	820	7931	0404040404040404	820
7342	0404040404040404	820	7460	0404040404040404	820	7578	0404040404040404	820	7696	0404040404040404	820	7814	0404040404040404	820	7932	0404040404040404	820
7343	0404040404040404	820	7461	0404040404040404	820	7579	0404040404040404	820	7697	0404040404040404	820	7815	0404040404040404	820	7933	0404040404040404	820
7344	0404040404040404	820	7462	0404040404040404	820	7580	0404040404040404	820	7698	0404040404040404	820	7816	0404040404040404	820	7934	0404040404040404	820
7345	0404040404040404	820	7463	0404040404040404	820	7581	0404040404040404	820	7699	0404040404040404	820	7817	0404040404040404	820	7935	0404040404040404	820
7346	0404040404040404	820	7464	0404040404040404	820	7582	0404040404040404	820	7700	0404040404040404	820	7818	0404040404040404	820	7936	0404040404040404	820
7347	0404040404040404	820	7465	0404040404040404	820	7583	0404040404040404	820	7701	0404040404040404	820	7819	0404040404040404	820	7937	0404040404040404	820
7348	0404040404040404	820	7466	0404040404040404	820	7584	0404040404040404	820	7702	0404040404040404	820	7820	0404040404040404	820	7938	0404040404040404	820
7349	0404040404040404	820	7467	0404040404040404	820	7585	0404040404040404	820	7703	0404040404040404	820	7821	0404040404040404	820	7939	0404040404040404	820
7350	0404040404040404	820	7468	0404040404040404	820	7586	0404040404040404	820	7704	0404040404040404	820	7822	0404040404040404	820	7940	0404040404040404	820
7351	0404040404040404	820	7469	0404040404040404	820	7587	0404040404040404	820	7705	0404040404040404	820	7823	0404040404040404	820	7941	0404040404040404	820
7352	0404040404040404	820	7470	0404040404040404	820	7588	0404040404040404	820	7706	0404040404040404	820	7824	0404040404040404	820	7942	0404040404040404	820
7353	0404040404040404	820	7471	0404040404040404	820	7589	0404040404040404	820	7707	0404040404040404	820	7825	0404040404040404	820	7943	0404040404040404	820
7354	0404040404040404	820	7472	0404040404040404	820	7590	0404040404040404	820	7708	0404040404040404	820	7826	0404040404040404	820	7944	0404040404040404	820
7355	0404040404040404	820	7473	0404040404040404	820	7591	0404040404040404	820	7709	0404040404040404	820	7827	0404040404040404	820	7945	0404040404040404	820
7356	0404040404040404	820	7474	0404040404040404	820	7592	0404040404040404	820	7710	0404040404040404	820	7828	0404040404040404	820	7946	0404040404040404	820
7357	0404040404040404	820	7475	0404040404040404	820	7593	0404040404040404	820	7711	0404040404040404	820	7829	0404040404040404	820	7947	0404040404040404	820
7358	0404040404040404	820	7476	0404040404040404	820	7594	0404040404040404	820	7712	0404040404040404	820	7830	0404040404040404	820	7948	0404040404040404	820
7359	0404040404040404	820	7477	0404040404040404	820	7595	0404040404040404	820	7713	0404040404040404	820	7831	0404040404040404	820	7949	0404040404040404	820
7360	0404040404040404	820	7478	0404040404040404	820	7596	0404040404040404	820	7714	0404040404040404	820	7832	0404040404040404	820	7950	0404040404040404	820
7361	0404040404040404	820	7479	0404040404040404	820	7597	0404040404040404	820	7715	0404040404040404	820	7833	0404040404040404	820	7951	0404040404040404	820
7362	0404040404040404	820	7480	0404040404040404	820	7598	0404040404040404	820	7716	0404040404040404	820	7834	0404040404040404	820	7952	0404040404040404	820
7363	0404040404040404	820	7481	0404040404040404	820	7599	0404040404040404	820	7717	0404040404040404	820	7835	0404040404040404	820	7953	0404040404040404	820
7364	0404040404040404	820	7482	0404040404040404	820	7600	0404040404040404	820	7718	0404040404040404	820	7836	0404040404040404	820	7954	0404040404040404	820
7365	0404040404040404	820	7483	0404040404040404	820	7601	0404040404040404	820	7719	0404040404040404	820	7837	0404040404040404	820	7955	0404040404040404	820
7366	0404040404040404	820	7484	0404040404040404	820	7602	0404040404040404	820	7720	0404040404040404	820	7838	0404040404040404	820	7956	0404040404040404	820
7367	0404040404040404	820	7485	0404040404040404	820	7603	0404040404040404	820	7721	0404040404040404	820	7839	0404040404040404	820	7957	0404040404040404	820
7368	0404040404040404	820	7486	0404040404040404	820	7604	0404040404040404	820	7722	0404040404040404	820	7840	0404040404040404	820	7958	0404040404040404	820
7369	0404040404040404	820	7487	0404040404040404	820	7605	0404040404040404	820	7723	0404040404040404	820	7841	0404040404040404	820	7959	0404040404040404	820
7370	0404040404040404	820	7488	0404040404040404	820	7606	0404040404040404	820	7724	0404040404040404	820	7842	0404040404040404	820	7960	0404040404040404	820
7371	0404040404040404	820	7489	0404040404040404	820	7607	0404040404040404	820	7725	0404040404040404	820	7843	0404040404040404	820	7961	0404040404040404	820
7372	0404040404040404	820	7490	0404040404040404	820	7608	0404040404040404	820	7726	0404040404040404	820	7844	0404040404040404	820	7962	0404040404040404	820
7373	0404040404040404	820	7491	0404040404040404	820	7609	0404040404040404	820	7727	0404040404040404	820	7845	0404040404040404	820	7963	0404040404040404	820
7374	0404040404040404	820	7492	0404040404040404	820	7610	0404040404040404	820	7728	0404040404040404	820	7846	0404040404040404	820	7964	0404040404040404	820
7375	0404040404040404	820	7493	0404040404040404	820	7611	0404040404040404	820	7729	0404040404040404	820	7847	0404040404040404	820	7965	0404040404040404	820
7376	0404040404040404	820	7494	0404040404040404	820	7612	0404040404040404	820	7730	0404040404040404	820	7848	0404040404040404	820	7966	0404040404040404	820
7377	0404040404040404	820	7495	0404040404040404	820	7613	0404040404040404	820	7731	0404040404040404	820	7849	0404040404040404	820	7967	0404040404040404	820
7378	0404040404040404	820	7496	0404040404040404	820	7614	0404040404040404	820	7732	0404040404040404	820	7850	0404040404040404	820	7968	0404040404040404	820
7379	0404040404040404	820	7497	0404040404040404	820	7615	0404040404040404	820	7733	0404040404040404	820	7851	0404040404040404	820	79		

Program 1.

```

10 REM *****
20 REM ***** BACK UP UTILITY *****
30 REM ***** K.R. LASLETT 1985 *****
40 REM *****
50 ON BREAK GOSUB 800
60 IN# 0: B% IN# 1: C% IN# 2: G% IN# 3: Z%
70: BODGE: B%PAPER: B%PEN: B%ORIGIN: B%CLS
80 LOCATE 1,25:PRINT"LOADING PLEASE WAIT!!"
90 REM *****TAP*****
100 PLOT 120,70:DRAW 120,100:1-DRAW 170,100:DRAW 170,9
0:DRAW 250,70:DRAW 250,50:DRAW 250,0:DRAW 230,77:DRAW
250,77:DRAW 250,70:DRAW 230,70:DRAW 230,67:DRAW 230,6
7:DRAW 250,60:DRAW 200,60:DRAW 200,50:DRAW 190,50:DRAW
190,40:DRAW 190,30:DRAW 180,30
110 DRAW 170,70:DRAW 170,60:DRAW 160,60:DRAW 160,90:DR
AW 150,90:DRAW 150,0:DRAW 140,0:DRAW 140,70:DRAW 160
70:DRAW 170,70:DRAW 170,0:DRAW 160,0:DRAW 180,77:DR
AW 170,77:DRAW 170,0:DRAW 200,0:DRAW 210,0:DRAW 210
77:DRAW 200,77:DRAW 200,0
120 PLOT 190,70:DRAW 190,60:PLOT 220,90:DRAW 220,60:PL
OT 140,90:DRAW 120,90
130 SCR *****
140 PLOT 260,90:DRAW 340,90:DRAW 340,60:DRAW 310,60:DR
AW 310,90:PLOT 310,0:DRAW 300,0:DRAW 300,40:DRAW 290
40:DRAW 290,0:DRAW 260,0:DRAW 260,90:DRAW 320,0:DR
AW 330,0:DRAW 330,77:DRAW 320,77:DRAW 320,0
150 SCR *****TAP*****
160 PLOT 340,100:DRAW 410,100:DRAW 410,90:DRAW 490,90:
DRAW 490,0:DRAW 470,0:DRAW 470,77:DRAW 490,77:DRAW
50,70:DRAW 470,70:DRAW 470,67:DRAW 490,67:DRAW 490,60:
DRAW 440,60:DRAW 440,50:DRAW 430,50:DRAW 430,0:DRAW 4
20,0:DRAW 420,70:DRAW 410,70
170 DRAW 410,60:DRAW 400,60:DRAW 400,90:DRAW 390,90:DR

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AW 390,60:DRAW 380,60:DRAW 380,90:DRAW 360,90:DRAW 360
100:DRAW 400,90:DRAW 410,90:PLOT 410,0:DRAW 420,0:DR
AW 420,77:DRAW 410,77:DRAW 410,0:PLOT 430,90:DRAW 43
0,60:PLOT 440,90:DRAW 460,0
100 PLOT 440,0:DRAW 450,0:DRAW 450,77:DRAW 440,77:DR
AW 440,0
190 REM *****CASSETTE*****
200 PLOT 90,320:DRAW 100,320:DRAW 290,320:DRAW 100,310
:DRAW 300,210:DRAW 290,200:DRAW 100,200:DRAW 90,210:DR
AW 90,320:PLOT 120,200:DRAW 130,210:DRAW 240,230:DRAW
270,230
210 PLOT 150,230:DRAW 150,220:DRAW 150,213:DRAW 150,21
3:DRAW 150,210:PLOT 240,220:DRAW 240,213:DRAW 232,213:
DRAW 232,220:DRAW 240,220:PLOT 170,207:DRAW 220,207:DR
AW 220,275:DRAW 170,275:DRAW 170,0
220 PLOT 320,320:DRAW 340,330:DRAW 530,330:DRAW 540,32
0:DRAW 540,210:DRAW 530,200:DRAW 340,200:DRAW 330,210:
DRAW 330,320:PLOT 360,230:DRAW 370,230:DRAW 500,230:DR
AW 510,200:PLOT 390,220:DRAW 390,220:DRAW 500,210:DRAW
390,210:DRAW 390,220
230 PLOT 400,220:DRAW 400,213:DRAW 472,213:DRAW 472,22
0:DRAW 400,220:PLOT 410,207:DRAW 460,207:DRAW 460,275:
DRAW 410,275:DRAW 410,0
240 PLOT 100,210:DRAW 110,220,210:DRAW 200,220:DRAW 290
210:DRAW 290,240:DRAW 100,240:DRAW 100,310:PLOT 340,31
0:DRAW 322,320:DRAW 520,320:DRAW 530,310:DRAW 530,240:
DRAW 540,240:DRAW 540,310
250 PLOT 140,240:DRAW 250,240:PLOT 250,240:DRAW 140,24
0:PLOT 360,290:DRAW 490,290:PLOT 490,290:DRAW 360,290
260 REM *****
270 PLOT 70,240,210:DRAW 60,250:DRAW 60,200:DRAW 70,200:
DRAW 100,70:DRAW 110,330:DRAW 110,350:DRAW 100,340:DR
AW 70,340:PLOT 100,350:DRAW 60,350:DRAW 70,340:DRAW 70
370:DRAW 60,350:DRAW 100,350:DRAW 100,370

```

AMSTRAD TAPE BACK UP

HOW MANY times have you sat there waiting for what seems to be forever for a program to Load? Well type in this program and make back up copies of your slow loading software that will then Load at twice the normal speed. Alternatively, just make security copies at the reliable normal speed.

A problem that I have encountered with the Amstrad is the way in which the speed of cassette mechanisms vary from machine to machine. Some software will only successfully load one in three attempts which is another reason for making one or maybe two back up copies of that brand new game.

Software recorded on your machine will always be pin sharp and reliable to load successfully even at the fast rate. I generally make two copies of my valuable software, one on a C15 at the fast rate and the other on a C90 at normal speed, just in case.

To use the program type in program 1, check it and save it to tape with

SAVE "AMSTRAD BACK UP"

Now type in program 2, check it and again save it to tape with

SAVE "AMSTRAD BACK UP"

Lastly, type in program 3. Before running save the Basic to another cassette with

SAVE "Data"

Check it carefully then Run it. Insert your first tape with the first two programs on and Save the resulting code.

Reset computer with Ctrl/Shift/Escape. Rewind tape press Ctrl/small Enter and the program will auto run.

The program is user-friendly in that not many instructions are necessary. If all goes well in the loading the computer will beep at you, and ask Save Speed, just press 1 for Fast or 0 for

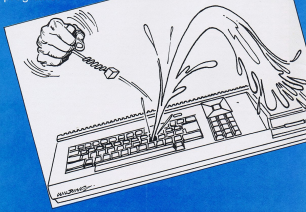
Normal. You will now be presented with Press Play then any key; which is the standard message you see when you load any program. So why not rewind this tape and make a back up copy of this program just to test it? It copies a program section by section. This program is

made up of three sections.

- 1st section 3 blocks
- 2nd section 1 block
- 3rd section 1 block

If all is going well, the bottom of the screen should read Loading Amstrad Back Up Block

KR Laslett with a quick and easy way to take extra copies of precious programs.



```

350 DRAW 580,370: DRAW 580,350: DRAW 580,330: DRAW 580,310
PLOT 120,140: DRAW 120,370: DRAW 140,370: DRAW 140,350: DRAW
140,330: DRAW 140,310: DRAW 230,370: DRAW 240,370: DRAW
240,350: DRAW 240,330: DRAW 240,310: DRAW 340,370: DRAW 350,370: DRAW 3
140,340
350 DRAW 370,340: DRAW 350,350: DRAW 330,340: DRAW 310,340
350 DRAW 310,370: DRAW 230,340: DRAW 210,350: DRAW 190,350:
DRAW 190,370: DRAW 280,370: DRAW 300,340: DRAW 320,340: DRAW
340,340: DRAW 360,340: DRAW 380,340: DRAW 380,370: DRAW 380,350: DRAW
380,330: DRAW 380,310: DRAW 350,340: DRAW 330,340: DRAW 310,340: DRAW
310,370: DRAW 210,340: DRAW 190,340: DRAW 170,340: DRAW 150,340: DRAW
140,350
350 DRAW 140,340: DRAW 120,340: PLOT 170,370: DRAW 170,34
0: DRAW 150,350: DRAW 170,370: PLOT 210,370: DRAW 210,350:
PLOT 240,370: DRAW 250,370: PLOT 270,370: DRAW 270,340: DRAW
270,320: DRAW 330,340: DRAW 330,370: DRAW 350,370: DRAW 350,340: DRAW
370,340
310 DRAW 350,370: DRAW 400,370: DRAW 410,360: DRAW 420,36
0: DRAW 410,350: DRAW 410,370: DRAW 470,370: DRAW 470,360:
DRAW 490,360: DRAW 490,370: PLOT 510,370: DRAW 510,350: DRAW 530,350: DR
AW 530,370: DRAW 600,340: DRAW 580,340: DRAW 560,370: DRAW
560,370
320 DRAW 560,340: DRAW 540,340: DRAW 540,370: DRAW 530,37
0: DRAW 530,350: DRAW 510,350: DRAW 510,370: DRAW 520,370:
DRAW 520,340: DRAW 510,340: DRAW 510,350: DRAW 530,350: DRAW
530,370: DRAW 480,340: DRAW 480,350: DRAW 480,370: DRAW 380,350: DRAW
380,340
330 DRAW 330,340: PLOT 370,360: DRAW 370,340: PLOT 370,37
0: DRAW 380,360: DRAW 480,360: DRAW 390,370: PLOT 450,370:
DRAW 450,340: PLOT 450,350: DRAW 430,370: DRAW 450,370: PL
OT 410,360: DRAW 410,340: PLOT 490,360: DRAW 490,340: PLOT
520,370: DRAW 520,350
340 PLOT 570,370: DRAW 570,370
350 REM *****SCN*****
360 PLOT 250,150: DRAW 270,165: DRAW 250,180: DRAW 350,14
5: DRAW 330,190: DRAW 380,165: DRAW 330,140: DRAW 350,165:

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DRAW 250,150
370 REM *****CIRCLES*****
380 PLOT 250,260: DRAW 250,240,2
390 FOR A=0 TO 67: DEG: ORIGIN 245,275: PLOT 16+COS(A), 16
+SIN(A): NEXT: ORIGIN 0,0
400 FOR A=272 TO 340: DEG: ORIGIN 245,275: PLOT 16+COS(A),
16+SIN(A): NEXT: ORIGIN 0,0
410 FOR A=0 TO 67: DEG: ORIGIN 485,275: PLOT 16+COS(A), 16
+SIN(A): NEXT: ORIGIN 0,0
420 FOR A=292 TO 340: DEG: ORIGIN 485,275: PLOT 16+COS(A),
16+SIN(A): NEXT: ORIGIN 0,0
430 FOR A=112 TO 257: DEG: ORIGIN 145,276: PLOT 16+COS(A),
16+SIN(A): NEXT: ORIGIN 0,0
440 FOR A=112 TO 257: DEG: ORIGIN 305,276: PLOT 16+COS(A),
16+SIN(A): NEXT: ORIGIN 0,0
450 R=10: X=150: Y=275: DEG: ORIGIN X,Y: FOR I=1 TO 4
500 B=3+COS(I): B=3+SIN(I): PLOT X,B,1: PLOT X,B,1: PLOT X,B,1
PLOT X,-B,1: PLOT X,-B,1: PLOT X,B,1: PLOT X,B,1: PLOT X,-B,1: PLOT X,-B,1:
NEXT
460 R=10: X=150: Y=275: DEG: ORIGIN X,Y: FOR I=1 TO 4
500 B=3+COS(I): B=3+SIN(I): PLOT X,B,1: PLOT X,B,1: PLOT X,B,1
PLOT X,-B,1: PLOT X,-B,1: PLOT X,B,1: PLOT X,B,1: PLOT X,-B,1: PLOT X,-B,1:
NEXT
470 R=10: X=190: Y=275: DEG: ORIGIN X,Y: FOR I=1 TO 4
500 B=3+COS(I): B=3+SIN(I): PLOT X,B,1: PLOT X,B,1: PLOT X,B,1
PLOT X,-B,1: PLOT X,-B,1: PLOT X,B,1: PLOT X,B,1: PLOT X,-B,1: PLOT X,-B,1:
NEXT
480 R=10: X=190: Y=275: DEG: ORIGIN X,Y: FOR I=1 TO 4
500 B=3+COS(I): B=3+SIN(I): PLOT X,B,1: PLOT X,B,1: PLOT X,B,1
PLOT X,-B,1: PLOT X,-B,1: PLOT X,B,1: PLOT X,B,1: PLOT X,-B,1: PLOT X,-B,1:
NEXT
490 PAPER 60: BEEP
500 ORIGIN 0,0: STOP

```

CK UP

I etc, to Block 3. Afterwards, automatically the computer responds with Press Rec and Play then any key, which instructs you to place your back up tape into the machine, press appropriate buttons and any key.

A powerful feature on this program is the Save again option which when your three blocks have been Saved should appear on the bottom of the screen. Simply press Y for yes or N for no. Upon pressing Y the section will be Saved again, on pressing N the program will go back to Press Play then any key in which case carry on with the next section etc.

The program as it stands will transfer a section up to about 22 blocks in length which in most cases will be sufficient. You should become accustomed to this program very quickly as it's very easy to use and the screen always tells you what's going on.

If you get the message "read error a" or a similar message which tells you there's a tape loading error, don't despair press Escape, rewind the tape and load the section again. I've tried to make the program as crash-proof as possible ie, if Escape is pressed during Loading the program will call a routine to reset the cassette manager and call the load routine once more.

If the program hasn't operated as described then re-load the machine code loader, if you save it separately on a tape — program 3 — and check the data carefully. Then re-Save the resultant code. Then try again.

If anybody doesn't want the task of typing in the program, tape copies are available with full instructions from: Mr. K.R. Laslett, 12 Wintour House, Loweswater Close, Wembley HA9 8UP at £3.00 per copy.

Program 2.

```

5 REM *****
10 REM ***** BASIC CONTROL PROGRAM *****
15 REM ***** K.R. LASLETT *****
20 REM *****
25 MEMORY 42999: LOAD ""
30 WINDOW 1,40,24,25: CALL @BC65: CLS: PRINT CHR$(7): PRINT
T: INPUT SAVE SPEED: PRINT @=NORMAL OR 1-FAST.
40 A$=INKEY$: IF A$="" GOTO 40
50 IF A$="1" THEN SPEED WRITE 1
60 CLS: PRINT CHR$(7): CALL 43000
70 CLS: PRINT CHR$(7): PRINT "SAVE AGAIN": PRINT "YES OR NO
"
80 B$=INKEY$: IF B$="" GOTO 80
90 IF B$="Y" OR B$="y" THEN 110
100 GOTO 60
110 CLS: PRINT CHR$(7): CALL @AB23: GOTO 70

```

Program 3.

```

10 REM MACHINE CODE LOADER
20 MEMORY 42999
30 FOR address=43000 TO 43095
40 READ byte: POKE address, byte
50 NEXT address
60 SAVE "AMSTRAD BACK UP", B, 43000, 96
65 END
100 DATA @06, @07, @21, @EB, @03, @11, @2B, @04
110 DATA @CD, @77, @BC, @D2, @4C, @AB, @22, @EA
120 DATA @03, @ED, @53, @EC, @03, @ED, @43, @EE
130 DATA @03, @32, @F0, @03, @21, @2B, @0C, @CD
140 DATA @B3, @BC, @D2, @4C, @AB, @22, @F1, @03
150 DATA @CD, @7A, @BC, @06, @10, @2A, @EA, @03
160 DATA @11, @2B, @04, @CD, @0C, @BC, @D2, @52
170 DATA @AB, @22, @F3, @03, @21, @2B, @0C, @ED
180 DATA @5B, @EE, @03, @ED, @4B, @F1, @03, @3A
190 DATA @F0, @03, @CD, @9B, @BC, @D2, @52, @AB
200 DATA @C1, @BF, @BC, @C9, @CD, @7D, @BC, @C3
210 DATA @F6, @A7, @CD, @92, @BC, @C3, @F8, @A7

```

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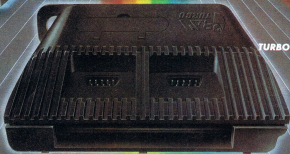
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TOP TIPS

LISTER

This short machine code program formats the listing so that each statement is printed on a new line and indented. Since Basic regards IF...Then as two statements these are also separated.

The routine it can be saved to tape with:

SAVE "LISTER" 65368.66

To use the routine:

PRINT: RANDOMIZE USER address to LIST to the screen or by

PRINT: *3: RANDOMIZE USER address to send to the Printer. Alan Myrland.

```
100 REM *** LISTER ***
110 REM *** THIS PROGRAM FORMATS THE LISTING ***
120 REM *** SO THAT EACH STATEMENT IS PRINTED ON A NEW LINE ***
130 REM *** AND INDENTED. SINCE BASIC REGARDS IF...THEN AS TWO ***
140 REM *** STATEMENTS THESE ARE ALSO SEPARATED. ***
150 REM *** THE ROUTINE IT CAN BE SAVED TO TAPE WITH: ***
160 REM *** SAVE "LISTER" 65368.66 ***
170 REM *** TO USE THE ROUTINE: ***
180 REM *** PRINT: RANDOMIZE USER ADDRESS TO LIST TO THE SCREEN ***
190 REM *** OR BY ***
200 REM *** PRINT: *3: RANDOMIZE USER ADDRESS TO SEND TO THE PRINTER. ***
210 REM *** ALAN MYRLAND. ***
220 REM ***
230 REM ***
240 REM ***
250 REM ***
260 REM ***
270 REM ***
280 REM ***
290 REM ***
300 REM ***
310 REM ***
320 REM ***
330 REM ***
340 REM ***
350 REM ***
360 REM ***
370 REM ***
380 REM ***
390 REM ***
400 REM ***
410 REM ***
420 REM ***
430 REM ***
440 REM ***
450 REM ***
460 REM ***
470 REM ***
480 REM ***
490 REM ***
500 REM ***
510 REM ***
520 REM ***
530 REM ***
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560 REM ***
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590 REM ***
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610 REM ***
620 REM ***
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640 REM ***
650 REM ***
660 REM ***
670 REM ***
680 REM ***
690 REM ***
700 REM ***
710 REM ***
720 REM ***
730 REM ***
740 REM ***
750 REM ***
760 REM ***
770 REM ***
780 REM ***
790 REM ***
800 REM ***
810 REM ***
820 REM ***
830 REM ***
840 REM ***
850 REM ***
860 REM ***
870 REM ***
880 REM ***
890 REM ***
900 REM ***
910 REM ***
920 REM ***
930 REM ***
940 REM ***
950 REM ***
960 REM ***
970 REM ***
980 REM ***
990 REM ***
```

UTILITY PROGRAM

I find this short machine code program extremely useful when writing large programs involving printing control characters.

To enable the program, type SYS 564 (50000). This has to be typed after typing New because the IRQ vector is reset. This also occurs after pressing Run/Stop and Restore. Matthew Wilkie.

```
100 RESTORE
110 FOR I=50000 TO 50012
120 NEXT I
130 NEXT I
140 FOR I=49152 TO 49197
150 NEXT I
160 NEXT I
170 REM TYPE "SYS 564"
180 REM TO ENABLE
190 REM 120, 163, 3, 141, 20
200 REM 163, 192, 141, 21
210 REM 85, 96, 32, 193
220 REM 1255, 166, 199, 207, 3
230 REM 476, 49, 234, 202, 169
240 REM 119, 2, 281, 135, 280
250 REM 169, 9, 141, 212, 0
260 REM 476, 49, 234, 201, 134
270 REM 248, 3, 76, 49, 234
280 REM 169, 235, 141, 212
290 REM 163, 9, 141, 135
300 REM 76, 49, 234
```

'CHEQUE BOOK'

I recently bought an adventure game set in space for my Amstrad. The program used normal text printout, but all the numbers on the screen were like those seen at the bottom of cheques. I have looked all through the character set, including getting my Amstrad to printout the characters from 128 to 255, and I cannot find these "cheque numbers". How did the people who wrote the adventure do it?

Martin Wicks,
Widow,
Essex.

IT IS LIKELY that the standard numbers in the Amstrad character set were redefined, using the Symbol command. The following routine, which you can use in combination with any program, will produce numbers as requested by you.

```
10 REM "Cheque book" numbers
20 SYMBOL: 0-127: 45
30 SYMBOL: 128-255: 0-127: 128-255: 45
40 SYMBOL: 128-255: 128-255: 128-255: 45
50 SYMBOL: 128-255: 128-255: 128-255: 45
60 SYMBOL: 128-255: 128-255: 128-255: 45
70 SYMBOL: 128-255: 128-255: 128-255: 45
80 SYMBOL: 128-255: 128-255: 128-255: 45
90 SYMBOL: 128-255: 128-255: 128-255: 45
100 SYMBOL: 128-255: 128-255: 128-255: 45
110 SYMBOL: 128-255: 128-255: 128-255: 45
120 SYMBOL: 128-255: 128-255: 128-255: 45
```

DRAGON BUG?

While writing a program on the Dragon 32, I came across a quite interesting message. Error messages on the Dragon generally consist only of two letters, such as SN Error, but during the execution of one program I got two words. The Dragon was waiting for an ordinary input response, and I entered "Bill, Fred". The Dragon replied "Extra ignored", and asked for the input again. It seems the Dragon ignores everything following the comma. I've tried everything else, such as semi-colons, but they do not work.

S J Lanson,
Barstey,
Surrey Yorkshire.

MANY COMPUTERS will behave in just the same way as your Dragon when presented with a comma within an input. You can only use this if you allow for more than one variable to be assigned with the word Input, as in:

INPUT "ENTER NAME"; A\$, B\$

If you do this, you'll find the computer will accept input separated by a comma, and will assign the material to the left of the comma to the first variable (A\$) and the rest of the material to the second one (B\$).

VAL ON THE QL

I have recently received a QL and am generally very pleased

RESPONSE

Do you have a problem related to your micro? Tim Hartnell will do his best to help. Please include only one question per letter and mark it "Response Frame". Alternatively, perhaps you have an idea you'd like to pass on to others. Why not write to us with your top tips?

with it, having previously owned a BBC Model B and a 48K Spectrum. On trying to convert some Spectrum programs, I've discovered that omissions from SuperBasic make it fairly difficult. I know about coercion, but still find I need Val on the QL. Is there any way of making a Val function? Lastly, is the JM the latest version of the computer available? I have an Alt version. Finally, could you tell me how long it takes to load QLs? I wish to know if my Microdrives are as fast as they should be.

S Tomasi,
Dorchester,
Devon.

THE ONLY WAY to emulate Val on the QL is to make use of coercion, but not the output before printing the result on the screen. The material you are Valing should be of a predictable type, and you might find that adding, or subtracting, 0.5 gives the answer you want — and perhaps using INT as well.

The latest version of the QL-out, at the time of going to press, is the JS, which is significantly better than JM, which is the version which immediately preceded it. It includes good error-trapping.

Version 1.1 of QDOS, in the JS Rom, runs Microdrives more quickly than the earlier version. However, because Quill itself has been progressively improved, the time it takes to load depends almost entirely on which Quill you have, rather than the speed with which your Microdrives work. The first version of Quill, on the first (clodged) QL's, took some 70 seconds to load. The time is now down to 20 or less.

In an earlier issue of Your Computer, I gave a routine to simulate on the Spectrum the Left\$, Right\$ and Mid\$ string-handling commands used in most other Basics. Andy Gibbons on Peterborough suggests that it is simpler if the Def FN function is used, and

DRIVE PROBLEM

I have a Sinclair Microdrive and several cartridges. After fairly heavy use of the cartridges, one started to act strangely. I got the message "Microdrive not present" when I tried to catalogue, load or save. The first time this happened, I thought it was a one-off, and threw away the cartridge. However, after buying a new one, the same thing happened after a couple of weeks. How can I get the information back?

P D Scott,
Cwm.

SINCLAIR ALWAYS advises users of the Spectrum to make backup copies of important programs. Whenever I am developing a major program on the Spectrum, I save and reserve, using a name which ends with the number of the version I'm saving. I save the partially completed programs on two different cartridges, alternating the saves, so that if one goes down I still have a fairly recent version available.

It sounds to me as if you are giving your cartridges very heavy use. Perhaps you should make sure you do not use one exclusively from now on, and make back up copies frequently, on other cartridges. If you can borrow a second Microdrive, it would be worth trying to copy from your cartridge onto another one, placing your cartridge in the borrowed drive, rather than in your own drive.

Check that the edge connector on your Microdrive is completely clean, by rubbing it gently with an ordinary pencil rubber — and making sure bits of rubber don't get into the works!

outlines the following simple implementations of the standard string-handling, to simplify program conversions:

```
10 DEF FN LS (A$, X) = A$ (1 TO X): REM LEFTS
20 DEF FN RS (A$, X) = A$ (X + 1 TO): REM RIGHTS
30 DEF FN MS (A$, X, Y) = A$ (X TO (X + Y) - 1): REM MIDS
```

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Vampire and priest

Adam Murray,
12 AD Reg.,
BFPO 20.

Amstrad

Now look at lines 110 and 120. These hold the values of the keys to be used, and can be changed to your own choice. Initially they are set to use joysticks. The variable names are short but meaningful, e.g. VU%= key to use to move vampire up, PF%= key to use as fire for priest etc.

The routine between 560-630 is a simple fill routine and could be placed outside the program if the following parameters are passed: x%-X co-ord to start filling from, y%-Y co-ord to start filling from, c%- the colour to use in filling the area. In this case it must be the same as the outline of the shape. This could easily be changed to suite your own purposes.

I have used this routine to fill the church and castle at the start of the game and although slow does not need to be repeated after every game.

If all is well there should be a tuneful version of Greensleeves playing in the background. This is achieved simply by using the interrupts in the form of ON SQ(?) Gosub.

I think this program demonstrates what can be done with Locomotive Basic and without special techniques.

VAMPIRE AND PRIEST is a two-player game for the Amstrad CPC-464 and occupies just over 8K. It makes use of both sound and graphics with the latter being in Mode 0 - low resolution with 15 colours.

The game itself is written entirely in Amstrad Basic and is explained with the use of remark statements which can be left out when typing in the program.

Full instructions of how to play the game are provided within the program as is an option to change the skill level.

Provisions have been made for each player to use a joystick but with a few simple changes any keyboard/joystick layout is possible. This is how you do it.

Turn to appendix III page 16 of the user manual which should show a picture of the keyboard with appropriate values written on the individual keys.

```

770 PLOT -10,0,0
780 vcs:=vcs+1:IF vcs=24 THEN vcs:=1
790 RETURN
800
810 BORDER 1:INK 0:LC 13
820 FOR i%=1 TO 15:INK i%:LC NEXT
830 PRINT CHR$(223)+CHR$(181)
840 a$=CHR$(230)+""+CHR$(230)+""+CHR$(230)+""+CHR$(230)
850 b$=CHR$(143)+""+CHR$(143)+""+CHR$(143)+""+CHR$(143)
860
870 'set skyline
880
890 PA 15,26
900 PEN 2:LOCATE 1,1:PRINT STRING$(C%,143)
910 PEN 14:LOCATE 1,5:PRINT STRING$(C%,143)
920 PEN 13:LOCATE 1,9:PRINT STRING$(C%,143)
930 FOR i%=1 TO 20:LOCATE 12,1:PRINT STRING$(C%,143)
940 FOR i%=1 TO 3
950 PEN 12:LOCATE 3,0+I:PRINT STRING$(C%,143)
960 LOCATE 14,0+I:PRINT STRING$(C%,143)
970 NEXT
980 MOVE 0,225:DRAW 640,0,0
990
1000 'draw castle
1010
1020 RESTORE 1040
1030 MOVE 60,226
1040 FOR a%=1 TO 45:READ x%,y%:DRAW x%,y%:NEXT
1050 DATA 0,55,-10,10,-10,0,24,-4,16,-10,0,34,14,4
1060 DATA 0,-14,14,0,2,12,16,0,0,-6,12,-2,0,0,14
1070 DATA 10,0,0,-30,-10,-10,16,-4,0,0

```

```

16,40,0,0,12
1070 DATA 10,10,0,10,-10,10,0,20,12,0,0,-14,0,0
1080 DATA 9,10,10,0,0,-10,14,0,0,16,14,0,-4,0,-16,0
1090 DATA -14,-20,0,-65,-19,0,0,47,-96,0,0,-47,-14,0
1100
1110 'draw church
1120
1130 RESTORE 1160
1140 MOVE 400,220
1150 FOR d%=1 TO 11:READ x%,y%:DRAW x%,y%:NEXT
1160 DATA 0,90,35,0,35,-90,100,0,20,-20,0,-37,0,0,47,-100,0,47,-10,0
1170
1180 'fill castle
1190
1200 C%=5
1210 FOR i%=1 TO 7:READ x%,y%:GOSUB 56:NEXT
1220 DATA 71,229,181,359,40,355,193,310,220,370,169,370,180,229
1230
1240 'fill church
1250
1260 C%=15
1270 FOR i%=1 TO 3:READ x%,y%:GOSUB 56:NEXT
1280 DATA 431,329,432,334,516,229
1290 RESTORE 1340
1300 LOCATE 3,3:PF%=(PF%+1) MOD 255:PRINT CHR$(1240)+CHR$(181)+CHR$(1241)
1310 LOCATE 10,0:PAPER 15:PRINT CHR$(1240)+CHR$(181)+CHR$(1241)
1320 PAPER 0
1330
1340 'set up graves
1350

```

(continued on page 103)

```

10 *****
20 **** PRIEST AND VAMP, ****
30 **** WBS, ****
40 **** FOR THE ****
50 **** AMSTRAD CPC464, ****
60 **** WRITTEN BY ****
70 **** ADAM MURRAY, ****
80 *****
90
100 MODE 0
110 VU%=0:VCS=0:VLS=0:VRS=0:VFS=0:
KEYS FOR VAMP
120 PLOT=71:PDS=73:PLS=74:PRS=75:PF%=76
KEYS FOR PRIEST
130 mcs:=0:GOTO 100
140 mcs:=mcs+1:IF mcs=39 THEN RESTORE
160 mcs=0
170 READ x%,y%:BOUND 1,mcs,x%,y%,1,4:RE
TURN
180 DATA 25,560,50,470,25,426,37,379,1
2,350,25,377,50,426,25,586,37,670,12,5
40,25,306,50,470,25,560,37,505,12,682,
25,560,50,506,25,482,50,798,20,568
170 DATA 50,470,25,426,37,379,12,350,2
0,379,50,426,25,586,37,670,12,526,25,0
56,37,470,12,586,25,560,37,686,12,677,
25,630,75,560,50,560,0,0
100 BORDER 11
110 mcs=0:00
120 REM 1,10,-1,2
210 FOR i%=0 TO 15:INK i%:LC NEXT
230 SYMBOL AFTER 229
230
250 'define graves
260
260 SYMBOL 230,0,0,24,0,110,4,255,25
5
270
280 'define priest
290
300 SYMBOL 232,60,60,255,60,60,24,255,
205
310 SYMBOL 235,205,109,109,109,109,126,
126,126
320 SYMBOL 234,126,126,126,126,220,4,4
7
330 SYMBOL 235,126,126,126,39,32,32,22
4
340
350 'define vampire
360
370 SYMBOL 236,112,249,61,63,15,15,3,3
380 SYMBOL 237,14,145,100,202,240,240,
192,192
390 SYMBOL 230,1,1,7,31,63,57,40,32
400 SYMBOL 239,120,120,224,240,252,156,
17,4
410
420 'DEFINE WINGS
430
440 SYMBOL 240,0,0,24,92,82,82,145,145
450 SYMBOL 241,205,145,145,145,145,145,
145,255
460
470 'DEFINE GRAYS
480
490 SYMBOL 242,52,34,140,72,42,26,40,1
5
510 GOSUB 2460:Instructions
520 GOTO 010
530
540 'FILL ROUTINE
550
560 mcs:=mcs+y%*5
570 mcs:=mcs+y%*2
580 WHILE TEST(x%,y%)<CHR$(PLOT x%,y%),c
3:mcs:=c+4:NEXT
590 mcs:=c-4
600 WHILE TEST(x%,y%)<CHR$(PLOT x%,y%),c
3:mcs:=c+4:NEXT
610 mcs:=c
620 IF TEST(x%,y%+2)<C% THEN y%=y%+2:
80 TO 500
630 RETURN
640
650 IF TEST (vcs+32,y%-16)<C% THEN RE
TURN
660 SOUND 4,200,3,7:TAGOFF:PRINT CHR$(
223)+CHR$(181):TAG
670 PLOT -10,0,10:MOVE (vcs+16),(y%-8)
1:PRINT CHR$(230)+CHR$(vcs+16),(y%-8)
1:PRINT CHR$(143)
680 TAGOFF:PRINT CHR$(231)+CHR$(1):TAG
690 PLOT -10,0,0
700 mcs:=mcs-1:IF mcs=0 THEN vcs:=1
710 RETURN
720
730 IF TEST (x%-16,y%-32)<C% THEN R
ETURN
740 SOUND 4,100,2,7:TAGOFF:PRINT CHR$(
223)+CHR$(181):TAG
750 PLOT -10,0,0:MOVE x%,(y%-16):PRI
NT CHR$(230)+CHR$(vcs)
760 TAGOFF:PRINT CHR$(223)+CHR$(1):TAG

```

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OBS!!! Vid katalogbeställning v.g. medsänd 5:- Skr
i frimärken för portot.

SWESCOT

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(continued from page 101)

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1340 INK 10,20:INK 6,24
1370 FOR Y%:=10 TO 22 STEP 4
1380 LOCATE 2,Y%:PEN 10:PRINT #8
1390 LOCATE 2,Y%+1:PEN 10:PRINT #8
1400 NEXT Y%
1410 FOR Y%:=14 TO 22 STEP 4
1420 LOCATE 13,Y%:PEN 6:PRINT #8
1430 LOCATE 13,Y%+1:PEN 6:PRINT #8
1440 NEXT Y%
1450
1460 'set up variables
1470
1480 xv%:=410:vp%:=270 'co-ord of priest
1490 xv%:=80:vy%:=246 'co-ord of vampire
1500
1510 h%:=12
1520 'start of main game
1530
1540
1550 PRINT CHR$(231)+CHR$(1)
1560 TAB
1570 PLOT -10,0,0
1580 MOVE xp%,yp%:PRINT CHR$(232)+:MOV
E xp%,(yp%-16):PRINT CHR$(233)+:MOVE x
p%,(yp%+32):PRINT CHR$(234)+
1590 PLOT -10,0,9
1600 MOVE xv%,vy%:PRINT CHR$(235)+CHR$(
237)
1610 TAB
1620
1630 'main game loop
1640
1650 TIME:=TIME&4096:INT(RND*(1000))
1660 WHILE TIME>TIME AND vop%>0
1670 IF (X%-XV%)+16 AND (Y%-YV%)+24
THEN vop%+1
1680 PLOT -10,0,0:MOVE xp%,yp%:PRINT C
HR$(232)+:MOVE xp%,(yp%-16):PRINT C
HR$(233)+:MOVE xp%,(yp%+32):PRINT CHR$(23
4)+
1690 IF (X%+32)>0 AND (Y%+32)>0 THEN L%10
1700 IF DKEY(15)=0 AND TEST(xp%+16,y
p%+32)=0 THEN yp%+32
1710 IF DKEY(15)=0 AND TEST(xp%+16,y
p%+32)=0 THEN yp%+32
1720 IF DKEY(15)=0 AND TEST(xp%+16,y
p%+32)=0 THEN yp%+32
1730 IF DKEY(15)=0 AND TEST(xp%+32,y
p%+16)=0 AND xp%+32 THEN xp%+32
1740 MOVE xp%,yp%:PRINT CHR$(232)+:MOV
E xp%,(yp%-16):PRINT CHR$(233)+:MOVE x
p%,(yp%+32):PRINT CHR$(234)+
1750
1760 PLOT -10,0,9
1770 MOVE xv%,vy%:PRINT CHR$(235)+CHR$(
237)
1780 IF xv%+32>0 AND vp%+32>0 THEN 1800
1790 IF DKEY(15)=0 AND TEST(xp%+16,y
p%+32)=0 THEN yp%+32
1800 IF DKEY(15)=0 AND TEST(xp%+16,y
p%+32)=0 THEN yp%+32
1810 IF DKEY(15)=0 AND TEST(xp%+32,y
p%+16)=0 AND xp%+32 THEN xp%+32
1820 IF DKEY(15)=0 AND TEST(xp%+32,y
p%+16)=0 AND xp%+32 THEN xp%+32
1830 MOVE xp%,yp%:PRINT CHR$(232)+CHR$(
237)
1840 ON 80(1) GOSUB 140
1850 PLOT -10,0,0:MOVE xp%,yp%:PRINT C
HR$(232)+:MOVE xp%,(yp%-16):PRINT CHR$(
233)+:MOVE xp%,(yp%+32):PRINT CHR$(23
4)+
1860 IF DKEY(15)=0 AND to%+1 THEN GO TO 1750
1870 MOVE xp%,yp%:PRINT CHR$(232)+:MOV
E xp%,(yp%-16):PRINT CHR$(233)+:MOVE x
p%,(yp%+32):PRINT CHR$(234)+
1880 PLOT -10,0,9
1890 MOVE xv%,vy%:PRINT CHR$(235)+CHR$(
237)
1900 IF DKEY(15)=0 AND to%+2 THEN GO
SUB 850
1910 MOVE xv%,yp%:PRINT CHR$(235)+CHR$(
237)
1920 HEND
1930 IF vop%+1 THEN GOTO 1970
1940 SOUND 2,150,3,7,0,0,10
1950 IF to%+1 THEN INK 2,9:INK 14,21:
INK 13,19:GOSUB 130:INK 0,0:to%+2:GOTO
1610
1960 INK 0,0:INK 14,14:INK 13,26:GOSUB
R 11:to%+1:INK 0,15:GOTO 1610
1970 IF to%+2 THEN GOTO 2010 ELSE GOTO
2100
1980
1990 'vamp win
2000
2010 TAGOFF
2020 PRINT CHR$(23)+CHR$(0)
2030 TAB
2040 PLOT -10,0,0
2050 MOVE xp%,yp%:PRINT CHR$(143)+:MOV
E xp%,(yp%-16):PRINT CHR$(143)+:MOVE xp%,
(yp%+32):PRINT CHR$(143)+
2060 TAGOFF
2070 PRINT CHR$(23)+CHR$(1)
2080 PLOT -10,0,0
2090 FOR Y%:=12 TO 24
2100 INK 0,0:INK 25
2110 LOCATE 6,Y%:PRINT "Evil win!"
2120 SOUND 1,15,10,1,7
2130 NEXT Y%:INK 0,0:RESTORE 2510
2140 GOTO 2380
2150
2160 'priest win
2170
2180 TAGOFF
2190 PRINT CHR$(23)+CHR$(0)
2200 TAB
2210 PLOT -10,10,0
2220 MOVE xp%,yp%:PRINT CHR$(143)+:MOV
E xp%,(yp%-16):PRINT CHR$(143)+
2230 TAGOFF
2240 PRINT CHR$(23)+CHR$(1)
2250 FOR Y%:=12 TO 24
2260 INK 0,0:INK 25
2270 LOCATE 6,Y%:PRINT "Good win"
2280
2290 SOUND 1,15,10,1,7
2300 NEXT Y%:INK 0,0:RESTORE 2510
2310 FOR Y%:=1 TO 24:READ n%:SOUND 1,n%
+1,20,7:5:0:250 2,n%,20,7:NEXT
Y%
2320 FOR Y%:=37,45,60,0,45,47,45,40
,55,0,5,55,47,45,36,48,40,45,45,47,
55,47,40
2330 FOR Y%:=10 TO 15:LOCATE 1,Y%:PRINT
CHR$(11):NEXT
2340 GOTO 2350
2350
2360 'another go
2370
2380 INK 1,1:INK 26
2390 LOCATE 5,7:PRINT "Another go Y/N?"
2400
2410 IF DKEY(14)=0 THEN xv%+32:RESTORE
160:GOTO 2430
2420 IF DKEY(14)=0 THEN SUN
2430 GOTO 2370
2440 FOR Y%:=10 TO 15:LOCATE 1,Y%:PRINT
CHR$(0):NEXT
2450 GOTO 1330
2460 NEXT
2470
2480 'instructions
2490
2500 INK 0,26:INK 13,3,8
2510 LOCATE 5,1:PEN 12:PRINT "*****instr
uctions*****"
2520 LOCATE 5,10:PEN 13:PRINT "press sp
ace to cont."
2530 LOCATE 5,10:PEN 9:PRINT "press G to
start."
2540 IF DKEY(15)=0 THEN CLS:RESTORE
6070:GOTO 2520
2550 GOSUB 380
2560 LOCATE 1,0:PEN 3:PRINT "*****Vamp
ire*****"

```

```

2560 LOCATE 9,10:PRINT CHR$(230)+CHR$(
237)
2570 LOCATE 2,13:PEN 9:PRINT "up down
left right"
2580 LOCATE 5,15:PEN 11:PRINT "joy at t
ch 1"
2590 IF INKEY="" THEN 2590
2600 GOSUB 380
2610 LOCATE 1,0:PEN 6:PRINT "*****Prie
st*****"
2620 LOCATE 10,10:PEN 4:PRINT CHR$(232)
+CHR$(0)+CHR$(0)+CHR$(233)+CHR$(0)
+CHR$(0)+CHR$(234)
2630 LOCATE 2,14:PEN 9:PRINT "up down
left right"
2640 LOCATE 5,16:PEN 11:PRINT "joy at t
ch 0"
2650 IF INKEY="" THEN 2650
2660 GOSUB 380
2670 IF INKEY="" THEN 2670
2680 MODE 1:INK 1,0:INK 2,7,8
2690 PRINT "THE PRIEST MUST CHARGE ALL
THE CYAN"
2700 PRINT "GRAVES TO YELLOW AND THE VA
MPIRE SHOULD"
2710 FOR Y%:=10 TO 20:PRINT "THE OPPOSITE."
2720 PRINT
2730 PRINT "THE PRIEST MAY ONLY CHARGE
GRAVES"
2740 PRINT "DURING THE DAY AND THE VAMP
PIRE"
2750 PRINT "MAY ONLY CHARGE GRAVES DURI
NG"
2760 PRINT "THE NIGHT."
2770 PRINT
2780 PRINT "NIGHT IS INDICATED BY A SH
ADED GREEN"
2790 PRINT "SKY WHEREAS DAY IS INDICATE
D BY A"
2800 PRINT "SHADED BLUE SKY."
2810 PRINT
2820 PRINT "GRAVES ARE CHARGED BY POSIT
IONING LAMP"
2830 PRINT "PLAYER OVER THE TOP AND PRE
SSING"
2840 PRINT "THE JOYSTICK."
2850 PRINT
2860 PRINT "PRESS SPACE TO
CONTINUE."
2870 IF INKEY="" THEN GOTO 2070
2880
2890 PLOT 25:LOCATE 15,3:PRINT "WARNING."
2900 PRINT
2910 FOR Y%:=3:PRINT "DURING HIS OWN PLAYIN
G PERIOD A"
2920 PRINT "PLAYER MAY CAPTURE HIS OPPO
NENT FOR"
2930 PRINT "AN IMMEDIATE VICTORY."
2940 PRINT
2950 PRINT "*****"
2960 PRINT
2970 PRINT "PRINT:PRINT" INPUT SKILL
LEVEL 0 TO 20"
2980 PRINT "1-HARD 20-EASY"
2990 INPUT SKILL
3000 IF SKILL OR SKILL/20 THEN SOUND 1,5
,8,10,7:GOTO 2990
3010 SKILL=SKILL/100
3020 PRINT "PRINT:PRINT" PRESS SPA
CE 0 TO 100"
3030 IF INKEY="" THEN 3030
3040 MODE 0
3050 RETURN
3060 FOR Y%:=1 TO 25:LOCATE 1,Y%:PRINT C
HR$(11)
3070 FOR Y%:=1 TO 25:LOCATE 1,Y%:PRINT
CHR$(11):NEXT
3080 BORDER 0:0:0:1,100,10,7
3090 FOR Y%:=1 TO 100:NEXT
3100 BORDER 0:0:0:1,100,10,7
3110 FOR Y%:=1 TO 100:NEXT
3120 LOCATE 3,19:PEN 13:PRINT "press sp
ace to cont."
3130 RETURN

```

Busy bee

Tony Wye,
Hayes,
Middlesex.

This program is called Busy Bee and runs on the Spectrum 16 and 48K. It's a maze type game where you have to cut the grass on a lawn avoiding the bees who are attracted to you because of the lawn mower noise.

Upon loading, the game auto runs and the instructions are displayed and the keys to be used — cursor keys — then P must be pressed to play. The screen is set up and you must

move around the flower beds and out the grass avoiding the bees who are moving about. When all the grass is cut you leave the screen via the bottom and then your bonus is added according to the time you took to clear the grass. Then you go on to the differently shaped screen 2.

This carries on with the screens 1 and 2 in turn and each stage the bees are attracted more and more to you until it is nearly impossible to get away from them. By then all your lives will have been used up. When all three lives are used the game over sign will be displayed and tell you if it is a new high score.

The hex loader.

```

10 DEF FN A(X)=38+(CODE H%13)
11 DEF FN B(X)=38+(CODE H%12)
12 DEF FN C(X)=38+(CODE H%11)
13 DEF FN D(X)=38+(CODE H%10)
14 DEF FN E(X)=38+(CODE H%9)
15 DEF FN F(X)=38+(CODE H%8)
16 DEF FN G(X)=38+(CODE H%7)
17 DEF FN H(X)=38+(CODE H%6)
18 DEF FN I(X)=38+(CODE H%5)
19 DEF FN J(X)=38+(CODE H%4)
20 DEF FN K(X)=38+(CODE H%3)
21 DEF FN L(X)=38+(CODE H%2)
22 DEF FN M(X)=38+(CODE H%1)
23 DEF FN N(X)=38+(CODE H%0)
24 DEF FN O(X)=38+(CODE H%15)
25 DEF FN P(X)=38+(CODE H%14)
26 DEF FN Q(X)=38+(CODE H%13)
27 DEF FN R(X)=38+(CODE H%12)
28 DEF FN S(X)=38+(CODE H%11)
29 DEF FN T(X)=38+(CODE H%10)
30 DEF FN U(X)=38+(CODE H%9)
31 DEF FN V(X)=38+(CODE H%8)
32 DEF FN W(X)=38+(CODE H%7)
33 DEF FN X(X)=38+(CODE H%6)
34 DEF FN Y(X)=38+(CODE H%5)
35 DEF FN Z(X)=38+(CODE H%4)
36 DEF FN AA(X)=38+(CODE H%3)
37 DEF FN AB(X)=38+(CODE H%2)
38 DEF FN AC(X)=38+(CODE H%1)
39 DEF FN AD(X)=38+(CODE H%0)
40 DEF FN AE(X)=38+(CODE H%15)
41 DEF FN AF(X)=38+(CODE H%14)
42 DEF FN AG(X)=38+(CODE H%13)
43 DEF FN AH(X)=38+(CODE H%12)
44 DEF FN AI(X)=38+(CODE H%11)
45 DEF FN AJ(X)=38+(CODE H%10)
46 DEF FN AK(X)=38+(CODE H%9)
47 DEF FN AL(X)=38+(CODE H%8)
48 DEF FN AM(X)=38+(CODE H%7)
49 DEF FN AN(X)=38+(CODE H%6)
50 DEF FN AO(X)=38+(CODE H%5)
51 DEF FN AP(X)=38+(CODE H%4)
52 DEF FN AQ(X)=38+(CODE H%3)
53 DEF FN AR(X)=38+(CODE H%2)
54 DEF FN AS(X)=38+(CODE H%1)
55 DEF FN AT(X)=38+(CODE H%0)
56 DEF FN AU(X)=38+(CODE H%15)
57 DEF FN AV(X)=38+(CODE H%14)
58 DEF FN AW(X)=38+(CODE H%13)
59 DEF FN AX(X)=38+(CODE H%12)
60 DEF FN AY(X)=38+(CODE H%11)
61 DEF FN AZ(X)=38+(CODE H%10)
62 DEF FN BA(X)=38+(CODE H%9)
63 DEF FN BB(X)=38+(CODE H%8)
64 DEF FN BC(X)=38+(CODE H%7)
65 DEF FN BD(X)=38+(CODE H%6)
66 DEF FN BE(X)=38+(CODE H%5)
67 DEF FN BF(X)=38+(CODE H%4)
68 DEF FN BG(X)=38+(CODE H%3)
69 DEF FN BH(X)=38+(CODE H%2)
70 DEF FN BI(X)=38+(CODE H%1)
71 DEF FN BJ(X)=38+(CODE H%0)
72 DEF FN BK(X)=38+(CODE H%15)
73 DEF FN BL(X)=38+(CODE H%14)
74 DEF FN BM(X)=38+(CODE H%13)
75 DEF FN BN(X)=38+(CODE H%12)
76 DEF FN BO(X)=38+(CODE H%11)
77 DEF FN BP(X)=38+(CODE H%10)
78 DEF FN BQ(X)=38+(CODE H%9)
79 DEF FN BR(X)=38+(CODE H%8)
80 DEF FN BS(X)=38+(CODE H%7)
81 DEF FN BT(X)=38+(CODE H%6)
82 DEF FN BU(X)=38+(CODE H%5)
83 DEF FN BV(X)=38+(CODE H%4)
84 DEF FN BW(X)=38+(CODE H%3)
85 DEF FN BX(X)=38+(CODE H%2)
86 DEF FN BY(X)=38+(CODE H%1)
87 DEF FN BZ(X)=38+(CODE H%0)
88 DEF FN CA(X)=38+(CODE H%15)
89 DEF FN CB(X)=38+(CODE H%14)
90 DEF FN CC(X)=38+(CODE H%13)
91 DEF FN CD(X)=38+(CODE H%12)
92 DEF FN CE(X)=38+(CODE H%11)
93 DEF FN CF(X)=38+(CODE H%10)
94 DEF FN CG(X)=38+(CODE H%9)
95 DEF FN CH(X)=38+(CODE H%8)
96 DEF FN CI(X)=38+(CODE H%7)
97 DEF FN CJ(X)=38+(CODE H%6)
98 DEF FN CK(X)=38+(CODE H%5)
99 DEF FN CL(X)=38+(CODE H%4)
100 DEF FN CM(X)=38+(CODE H%3)
101 DEF FN CN(X)=38+(CODE H%2)
102 DEF FN CO(X)=38+(CODE H%1)
103 DEF FN CP(X)=38+(CODE H%0)
104 DEF FN CQ(X)=38+(CODE H%15)
105 DEF FN CR(X)=38+(CODE H%14)
106 DEF FN CS(X)=38+(CODE H%13)
107 DEF FN CT(X)=38+(CODE H%12)
108 DEF FN CU(X)=38+(CODE H%11)
109 DEF FN CV(X)=38+(CODE H%10)
110 DEF FN CW(X)=38+(CODE H%9)
111 DEF FN CX(X)=38+(CODE H%8)
112 DEF FN CY(X)=38+(CODE H%7)
113 DEF FN CZ(X)=38+(CODE H%6)
114 DEF FN DA(X)=38+(CODE H%5)
115 DEF FN DB(X)=38+(CODE H%4)
116 DEF FN DC(X)=38+(CODE H%3)
117 DEF FN DD(X)=38+(CODE H%2)
118 DEF FN DE(X)=38+(CODE H%1)
119 DEF FN DF(X)=38+(CODE H%0)
120 DEF FN DG(X)=38+(CODE H%15)
121 DEF FN DH(X)=38+(CODE H%14)
122 DEF FN DI(X)=38+(CODE H%13)
123 DEF FN DJ(X)=38+(CODE H%12)
124 DEF FN DK(X)=38+(CODE H%11)
125 DEF FN DL(X)=38+(CODE H%10)
126 DEF FN DM(X)=38+(CODE H%9)
127 DEF FN DN(X)=38+(CODE H%8)
128 DEF FN DO(X)=38+(CODE H%7)
129 DEF FN DP(X)=38+(CODE H%6)
130 DEF FN DQ(X)=38+(CODE H%5)
131 DEF FN DR(X)=38+(CODE H%4)
132 DEF FN DS(X)=38+(CODE H%3)
133 DEF FN DT(X)=38+(CODE H%2)
134 DEF FN DU(X)=38+(CODE H%1)
135 DEF FN DV(X)=38+(CODE H%0)
136 DEF FN DV(X)=38+(CODE H%15)
137 DEF FN DW(X)=38+(CODE H%14)
138 DEF FN DX(X)=38+(CODE H%13)
139 DEF FN DY(X)=38+(CODE H%12)
140 DEF FN EZ(X)=38+(CODE H%11)
141 DEF FN FA(X)=38+(CODE H%10)
142 DEF FN FB(X)=38+(CODE H%9)
143 DEF FN FC(X)=38+(CODE H%8)
144 DEF FN FD(X)=38+(CODE H%7)
145 DEF FN FE(X)=38+(CODE H%6)
146 DEF FN FF(X)=38+(CODE H%5)
147 DEF FN FG(X)=38+(CODE H%4)
148 DEF FN FH(X)=38+(CODE H%3)
149 DEF FN FI(X)=38+(CODE H%2)
150 DEF FN FJ(X)=38+(CODE H%1)
151 DEF FN FK(X)=38+(CODE H%0)
152 DEF FN FL(X)=38+(CODE H%15)
153 DEF FN FM(X)=38+(CODE H%14)
154 DEF FN FN(X)=38+(CODE H%13)
155 DEF FN FO(X)=38+(CODE H%12)
156 DEF FN FP(X)=38+(CODE H%11)
157 DEF FN FQ(X)=38+(CODE H%10)
158 DEF FN FR(X)=38+(CODE H%9)
159 DEF FN FS(X)=38+(CODE H%8)
160 DEF FN FT(X)=38+(CODE H%7)
161 DEF FN FU(X)=38+(CODE H%6)
162 DEF FN FV(X)=38+(CODE H%5)
163 DEF FN FW(X)=38+(CODE H%4)
164 DEF FN FX(X)=38+(CODE H%3)
165 DEF FN FY(X)=38+(CODE H%2)
166 DEF FN FZ(X)=38+(CODE H%1)
167 DEF FN GA(X)=38+(CODE H%0)
168 DEF FN GB(X)=38+(CODE H%15)
169 DEF FN GC(X)=38+(CODE H%14)
170 DEF FN GD(X)=38+(CODE H%13)
171 DEF FN GE(X)=38+(CODE H%12)
172 DEF FN GF(X)=38+(CODE H%11)
173 DEF FN GG(X)=38+(CODE H%10)
174 DEF FN GH(X)=38+(CODE H%9)
175 DEF FN GI(X)=38+(CODE H%8)
176 DEF FN GJ(X)=38+(CODE H%7)
177 DEF FN GK(X)=38+(CODE H%6)
178 DEF FN GL(X)=38+(CODE H%5)
179 DEF FN GM(X)=38+(CODE H%4)
180 DEF FN GN(X)=38+(CODE H%3)
181 DEF FN GO(X)=38+(CODE H%2)
182 DEF FN GP(X)=38+(CODE H%1)
183 DEF FN GQ(X)=38+(CODE H%0)
184 DEF FN GR(X)=38+(CODE H%15)
185 DEF FN GS(X)=38+(CODE H%14)
186 DEF FN GT(X)=38+(CODE H%13)
187 DEF FN GU(X)=38+(CODE H%12)
188 DEF FN GV(X)=38+(CODE H%11)
189 DEF FN GW(X)=38+(CODE H%10)
190 DEF FN GX(X)=38+(CODE H%9)
191 DEF FN GY(X)=38+(CODE H%8)
192 DEF FN GZ(X)=38+(CODE H%7)
193 DEF FN HA(X)=38+(CODE H%6)
194 DEF FN HB(X)=38+(CODE H%5)
195 DEF FN HC(X)=38+(CODE H%4)
196 DEF FN HD(X)=38+(CODE H%3)
197 DEF FN HE(X)=38+(CODE H%2)
198 DEF FN HF(X)=38+(CODE H%1)
199 DEF FN HG(X)=38+(CODE H%0)
200 DEF FN HH(X)=38+(CODE H%15)
201 DEF FN HI(X)=38+(CODE H%14)
202 DEF FN HJ(X)=38+(CODE H%13)
203 DEF FN HK(X)=38+(CODE H%12)
204 DEF FN HL(X)=38+(CODE H%11)
205 DEF FN HM(X)=38+(CODE H%10)
206 DEF FN HN(X)=38+(CODE H%9)
207 DEF FN HO(X)=38+(CODE H%8)
208 DEF FN HP(X)=38+(CODE H%7)
209 DEF FN HQ(X)=38+(CODE H%6)
210 DEF FN HR(X)=38+(CODE H%5)
211 DEF FN HS(X)=38+(CODE H%4)
212 DEF FN HT(X)=38+(CODE H%3)
213 DEF FN HU(X)=38+(CODE H%2)
214 DEF FN HV(X)=38+(CODE H%1)
215 DEF FN HW(X)=38+(CODE H%0)
216 DEF FN HX(X)=38+(CODE H%15)
217 DEF FN HY(X)=38+(CODE H%14)
218 DEF FN HZ(X)=38+(CODE H%13)
219 DEF FN IA(X)=38+(CODE H%12)
220 DEF FN IB(X)=38+(CODE H%11)
221 DEF FN IC(X)=38+(CODE H%10)
222 DEF FN ID(X)=38+(CODE H%9)
223 DEF FN IE(X)=38+(CODE H%8)
224 DEF FN IF(X)=38+(CODE H%7)
225 DEF FN IG(X)=38+(CODE H%6)
226 DEF FN IH(X)=38+(CODE H%5)
227 DEF FN II(X)=38+(CODE H%4)
228 DEF FN IJ(X)=38+(CODE H%3)
229 DEF FN IK(X)=38+(CODE H%2)
230 DEF FN IL(X)=38+(CODE H%1)
231 DEF FN IM(X)=38+(CODE H%0)
232 DEF FN IN(X)=38+(CODE H%15)
233 DEF FN IO(X)=38+(CODE H%14)
234 DEF FN IP(X)=38+(CODE H%13)
235 DEF FN IQ(X)=38+(CODE H%12)
236 DEF FN IR(X)=38+(CODE H%11)
237 DEF FN IS(X)=38+(CODE H%10)
238 DEF FN IT(X)=38+(CODE H%9)
239 DEF FN IU(X)=38+(CODE H%8)
240 DEF FN IV(X)=38+(CODE H%7)
241 DEF FN IW(X)=38+(CODE H%6)
242 DEF FN IX(X)=38+(CODE H%5)
243 DEF FN IY(X)=38+(CODE H%4)
244 DEF FN IZ(X)=38+(CODE H%3)
245 DEF FN JA(X)=38+(CODE H%2)
246 DEF FN JB(X)=38+(CODE H%1)
247 DEF FN JC(X)=38+(CODE H%0)
248 DEF FN JD(X)=38+(CODE H%15)
249 DEF FN JE(X)=38+(CODE H%14)
250 DEF FN JF(X)=38+(CODE H%13)
251 DEF FN JG(X)=38+(CODE H%12)
252 DEF FN JH(X)=38+(CODE H%11)
253 DEF FN JI(X)=38+(CODE H%10)
254 DEF FN JO(X)=38+(CODE H%9)
255 DEF FN JP(X)=38+(CODE H%8)
256 DEF FN JQ(X)=38+(CODE H%7)
257 DEF FN JR(X)=38+(CODE H%6)
258 DEF FN JS(X)=38+(CODE H%5)
259 DEF FN JT(X)=38+(CODE H%4)
260 DEF FN JU(X)=38+(CODE H%3)
261 DEF FN JV(X)=38+(CODE H%2)
262 DEF FN JW(X)=38+(CODE H%1)
263 DEF FN JX(X)=38+(CODE H%0)
264 DEF FN JY(X)=38+(CODE H%15)
265 DEF FN JZ(X)=38+(CODE H%14)
266 DEF FN KA(X)=38+(CODE H%13)
267 DEF FN KB(X)=38+(CODE H%12)
268 DEF FN KC(X)=38+(CODE H%11)
269 DEF FN KD(X)=38+(CODE H%10)
270 DEF FN KE(X)=38+(CODE H%9)
271 DEF FN KF(X)=38+(CODE H%8)
272 DEF FN KG(X)=38+(CODE H%7)
273 DEF FN KH(X)=38+(CODE H%6)
274 DEF FN KI(X)=38+(CODE H%5)
275 DEF FN KJ(X)=38+(CODE H%4)
276 DEF FN KK(X)=38+(CODE H%3)
277 DEF FN KL(X)=38+(CODE H%2)
278 DEF FN KM(X)=38+(CODE H%1)
279 DEF FN KN(X)=38+(CODE H%0)
280 DEF FN KO(X)=38+(CODE H%15)
281 DEF FN KP(X)=38+(CODE H%14)
282 DEF FN KQ(X)=38+(CODE H%13)
283 DEF FN KR(X)=38+(CODE H%12)
284 DEF FN KS(X)=38+(CODE H%11)
285 DEF FN KT(X)=38+(CODE H%10)
286 DEF FN KU(X)=38+(CODE H%9)
287 DEF FN KV(X)=38+(CODE H%8)
288 DEF FN KW(X)=38+(CODE H%7)
289 DEF FN KX(X)=38+(CODE H%6)
290 DEF FN KY(X)=38+(CODE H%5)
291 DEF FN KZ(X)=38+(CODE H%4)
292 DEF FN LA(X)=38+(CODE H%3)
293 DEF FN LB(X)=38+(CODE H%2)
294 DEF FN LC(X)=38+(CODE H%1)
295 DEF FN LD(X)=38+(CODE H%0)
296 DEF FN LE(X)=38+(CODE H%15)
297 DEF FN LF(X)=38+(CODE H%14)
298 DEF FN LG(X)=38+(CODE H%13)
299 DEF FN LH(X)=38+(CODE H%12)
300 DEF FN LI(X)=38+(CODE H%11)
301 DEF FN LJ(X)=38+(CODE H%10)
302 DEF FN LK(X)=38+(CODE H%9)
303 DEF FN LL(X)=38+(CODE H%8)
304 DEF FN LM(X)=38+(CODE H%7)
305 DEF FN LN(X)=38+(CODE H%6)
306 DEF FN LO(X)=38+(CODE H%5)
307 DEF FN LP(X)=38+(CODE H%4)
308 DEF FN LQ(X)=38+(CODE H%3)
309 DEF FN LR(X)=38+(CODE H%2)
310 DEF FN LS(X)=38+(CODE H%1)
311 DEF FN LT(X)=38+(CODE H%0)
312 DEF FN LU(X)=38+(CODE H%15)
313 DEF FN LV(X)=38+(CODE H%14)
314 DEF FN LW(X)=38+(CODE H%13)
315 DEF FN LX(X)=38+(CODE H%12)
316 DEF FN LY(X)=38+(CODE H%11)
317 DEF FN LZ(X)=38+(CODE H%10)
318 DEF FN MA(X)=38+(CODE H%9)
319 DEF FN MB(X)=38+(CODE H%8)
320 DEF FN MC(X)=38+(CODE H%7)
321 DEF FN MD(X)=38+(CODE H%6)
322 DEF FN ME(X)=38+(CODE H%5)
323 DEF FN MF(X)=38+(CODE H%4)
324 DEF FN MG(X)=38+(CODE H%3)
325 DEF FN MH(X)=38+(CODE H%2)
326 DEF FN MI(X)=38+(CODE H%1)
327 DEF FN MJ(X)=38+(CODE H%0)
328 DEF FN MK(X)=38+(CODE H%15)
329 DEF FN ML(X)=38+(CODE H%14)
330 DEF FN MM(X)=38+(CODE H%13)
331 DEF FN MN(X)=38+(CODE H%12)
332 DEF FN MO(X)=38+(CODE H%11)
333 DEF FN MP(X)=38+(CODE H%10)
334 DEF FN MQ(X)=38+(CODE H%9)
335 DEF FN MR(X)=38+(CODE H%8)
336 DEF FN MS(X)=38+(CODE H%7)
337 DEF FN MT(X)=38+(CODE H%6)
338 DEF FN MU(X)=38+(CODE H%5)
339 DEF FN MV(X)=38+(CODE H%4)
340 DEF FN MW(X)=38+(CODE H%3)
341 DEF FN MX(X)=38+(CODE H%2)
342 DEF FN MY(X)=38+(CODE H%1)
343 DEF FN MZ(X)=38+(CODE H%0)
344 DEF FN NA(X)=38+(CODE H%13)
345 DEF FN NB(X)=38+(CODE H%12)
346 DEF FN NC(X)=38+(CODE H%11)
347 DEF FN ND(X)=38+(CODE H%10)
348 DEF FN NE(X)=38+(CODE H%9)
349 DEF FN NF(X)=38+(CODE H%8)
350 DEF FN NG(X)=38+(CODE H%7)
351 DEF FN NH(X)=38+(CODE H%6)
352 DEF FN NI(X)=38+(CODE H%5)
353 DEF FN NJ(X)=38+(CODE H%4)
354 DEF FN NK(X)=38+(CODE H%3)
355 DEF FN NL(X)=38+(CODE H%2)
356 DEF FN NM(X)=38+(CODE H%1)
357 DEF FN NO(X)=38+(CODE H%0)
358 DEF FN NP(X)=38+(CODE H%15)
359 DEF FN NQ(X)=38+(CODE H%14)
360 DEF FN NR(X)=38+(CODE H%13)
361 DEF FN NS(X)=38+(CODE H%12)
362 DEF FN NT(X)=38+(CODE H%11)
363 DEF FN NU(X)=38+(CODE H%10)
364 DEF FN NV(X)=38+(CODE H%9)
365 DEF FN NW(X)=38+(CODE H%8)
366 DEF FN NX(X)=38+(CODE H%7)
367 DEF FN NY(X)=38+(CODE H%6)
368 DEF FN NZ(X)=38+(CODE H%5)
369 DEF FN OA(X)=38+(CODE H%4)
370 DEF FN OB(X)=38+(CODE H%3)
371 DEF FN OC(X)=38+(CODE H%2)
372 DEF FN OD(X)=38+(CODE H%1)
373 DEF FN OE(X)=38+(CODE H%0)
374 DEF FN OF(X)=38+(CODE H%15)
375 DEF FN OG(X)=38+(CODE H%14)
376 DEF FN OH(X)=38+(CODE H%13)
377 DEF FN OI(X)=38+(CODE H%12)
378 DEF FN OJ(X)=38+(CODE H%11)
379 DEF FN OK(X)=38+(CODE H%10)
380 DEF FN OL(X)=38+(CODE H%9)
381 DEF FN OM(X)=38+(CODE H%8)
382 DEF FN ON(X)=38+(CODE H%7)
383 DEF FN OO(X)=38+(CODE H%6)
384 DEF FN OP(X)=38+(CODE H%5)
385 DEF FN OQ(X)=38+(CODE H%4)
386 DEF FN OR(X)=38+(CODE H%3)
387 DEF FN OS(X)=38+(CODE H%2)
388 DEF FN OT(X)=38+(CODE H%1)
389 DEF FN OU(X)=38+(CODE H%0)
390 DEF FN OV(X)=38+(CODE H%15)
391 DEF FN OW(X)=38+(CODE H%14)
392 DEF FN OX(X)=38+(CODE H%13)
393 DEF FN OY(X)=38+(CODE H%12)
394 DEF FN OZ(X)=38+(CODE H%11)
395 DEF FN PA(X)=38+(CODE H%10)
396 DEF FN PB(X)=38+(CODE H%9)
397 DEF FN PC(X)=38+(CODE H%8)
398 DEF FN PD(X)=38+(CODE H%7)
399 DEF FN PE(X)=38+(CODE H%6)
400 DEF FN PF(X)=38+(CODE H%5)
401 DEF FN PG(X)=38+(CODE H%4)
402 DEF FN PH(X)=38+(CODE H%3)
403 DEF FN PI(X)=38+(CODE H%2)
404 DEF FN PJ(X)=38+(CODE H%1)
405 DEF FN PK(X)=38+(CODE H%0)
406 DEF FN PL(X)=38+(CODE H%15)
407 DEF FN PM(X)=38+(CODE H%14)
408 DEF FN PN(X)=38+(CODE H%13)
409 DEF FN PO(X)=38+(CODE H%12)
410 DEF FN PP(X)=38+(CODE H%11)
411 DEF FN PQ(X)=38+(CODE H%10)
412 DEF FN PR(X)=38+(CODE H%9)
413 DEF FN PS(X)=38+(CODE H%8)
414 DEF FN PT(X)=38+(CODE H%7)
415 DEF FN PU(X)=38+(CODE H%6)
416 DEF FN PV(X)=38+(CODE H%5)
417 DEF FN PW(X)=38+(CODE H%4)
418 DEF FN PX(X)=38+(CODE H%3)
419 DEF FN PY(X)=38+(CODE H%2)
420 DEF FN PZ(X)=38+(CODE H%1)
421 DEF FN QA(X)=38+(CODE H%0)
422 DEF FN QB(X)=38+(CODE H%15)
423 DEF FN QC(X)=38+(CODE H%14)
424 DEF FN QD(X)=38+(CODE H%13)
425 DEF FN QE(X)=38+(CODE H%12)
426 DEF FN QF(X)=38+(CODE H%11)
427 DEF FN QG(X)=38+(CODE H%10)
428 DEF FN QH(X)=38+(CODE H%9)
429 DEF FN QI(X)=38+(CODE H%8)
430 DEF FN QJ(X)=38+(CODE H%7)
431 DEF FN QK(X)=38+(CODE H%6)
432 DEF FN QL(X)=38+(CODE H%5)
433 DEF FN QM(X)=38+(CODE H%4)
434 DEF FN QN(X)=38+(CODE H%3)
435 DEF FN QO(X)=38+(CODE H%2)
436 DEF FN QP(X)=38+(CODE H%1)
437 DEF FN QQ(X)=38+(CODE H%0)
438 DEF FN QR(X)=38+(CODE H%15)
439 DEF FN QS(X)=38+(CODE H%14)
440 DEF FN QT(X)=38+(CODE H%13)
441 DEF FN QU(X)=38+(CODE H%12)
442 DEF FN QV(X)=38+(CODE H%11)
443 DEF FN QW(X)=38+(CODE H%10)
444 DEF FN QX(X)=38+(CODE H%9)
445 DEF FN QY(X)=38+(CODE H%8)
446 DEF FN QZ(X)=38+(CODE H%7)
447 DEF FN RA(X)=38+(CODE H%6)
448 DEF FN RB(X)=38+(CODE H%5)
449 DEF FN RC(X)=38+(CODE H%4)
450 DEF FN RD(X)=38+(CODE H%3)
451 DEF FN RE(X)=38+(CODE H%2)
452 DEF FN RF(X)=38+(CODE H%1)
453 DEF FN RG(X)=38+(CODE H%0)
454 DEF FN RH(X)=38+(CODE H%15)
455 DEF FN RI(X)=38+(CODE H%14)
456 DEF FN RJ(X)=38+(CODE H%13)
457 DEF FN RK(X)=38+(CODE H%12)
458 DEF FN RL(X)=38+(CODE H%11)
459 DEF FN RM(X)=38+(CODE H%10)
460 DEF FN RN(X)=38+(CODE H%9)
461 DEF FN RO(X)=38+(CODE H%8)
462 DEF FN RP(X)=38+(CODE H%7)
463 DEF FN RQ(X)=38+(CODE H%6)
464 DEF FN RR(X)=38+(CODE H%5)
465 DEF FN RS(X)=38+(CODE H%4)
466 DEF FN RT(X)=38+(CODE H%3)
467 DEF FN RU(X)=38+(CODE H%2)
468 DEF FN RV(X)=38+(CODE H%1)
469 DEF FN RW(X)=38+(CODE H%0)
470 DEF FN RX(X)=38+(CODE H%15)
471 DEF FN RY(X)=38+(CODE H%14)
472 DEF FN RZ(X)=38+(CODE H%13)
473 DEF FN SA(X)=38+(CODE H%12)
474 DEF FN SB(X)=38+(CODE H%11)
475 DEF FN SC(X)=38+(CODE H%10)
476 DEF FN SD(X)=38+(CODE H%9)
477 DEF FN SE(X)=38+(CODE H%8)
478 DEF FN SF(X)=38+(CODE H%7)
479 DEF FN SG(X)=38+(CODE H%6)
480 DEF FN SH(X)=38+(CODE H%5)
481 DEF FN SI(X)=38+(CODE H%4)
482 DEF FN SJ(X)=38+(CODE H%3)
483 DEF FN SK(X)=38+(CODE H%
```


33865	855E16D75E86073E	= 773	33294	011888C32038001	= 377	33977	8FEEA2009FEE1C20	= 782	33865	FE3428832278025A	= 780
33866	850732C1C316A11	= 915	33295	321189F3203F860	= 787	33980	87F83A20321780	= 785	33873	4050F32278025A	= 918
33867	01180211884E40005	= 685	33296	000A51521A8A953	= 380	33982	5A40D27021C0A47E	= 924	33881	8112A482C0F7047A	= 980
33868	518180210083C005	= 672	33297	941680A820C20A00	= 228	33984	388232408203F78	= 986	33889	5268232250823223	= 619
33869	85184918808E6268	= 786	33298	4614808202920A29	= 379	33987	548202322302502E	= 599	33897	853240953140508	= 711
33870	701152082020A47E	= 096	33299	291811808A1F02C0	= 503	33991	3040320020214A85	= 788	33905	02702F3E3602A47E	= 1808
33871	5A68858732A88521	= 678	33300	708C10C486A7087	= 994	33992	048470F1E6A4C7E	= 080	33915	8C02707F2E802A4	= 866
33872	8302224A1EC33370	= 045	33301	87F8787816F11807	= 797	33993	62780F2E802A4C7E	= 080	33921	76C0302F82022023	= 949
33873	5A407082020A47E	= 795	33302	0315703E18080000	= 284	33994	8C02707F2E802A4C7E	= 949	33928	FE1C201F8E802018	= 730
33874	3C321258C0233370	= 085	33303	0000000000000000	= 498	33995	FE1C201F8E802018	= 730	33937	5E13317518020315	= 783
33875	8C02707F2E802A4C7E	= 1129	33304	4653620A23518222	= 837	33996	FE1C201F8E802018	= 730	33945	FE1C201F8E802018	= 686
33876	8C02707F2E802A4C7E	= 1614	33305	588270A29474500	= 609	33997	FE1C201F8E802018	= 730	33953	FE1C201F8E802018	= 686
33877	7F1C201F8E802018	= 842	33306	02324F8270E20A82	= 749	33998	FE1C201F8E802018	= 730	33961	FE1C201F8E802018	= 686
33878	327085F0820A953E	= 658	33307	588270A29474500	= 609	33999	FE1C201F8E802018	= 730	33969	8220232F1C201F8E	= 684
33879	8132723580C27082	= 782	33308	4602703204623A01	= 724	34000	8220232F1C201F8E	= 684	33977	382018FE11201F8E	= 711
33880	FE843083278085FE	= 072	33309	024730A29474500	= 618	34001	8220232F1C201F8E	= 684	33985	802013FE132080FE	= 777
33881	8C238053081327180	= 408	33310	653072184C83827	= 899	34002	382018FE11201F8E	= 711	33993	8A2080FE132080FE	= 294
33882	889579732A013247	= 649	33311	3209732486C2D1870	= 605	34003	3A208032778085FE	= 777	34001	3A208032778085FE	= 851
33883	8132A0C81708420A	= 818	33312	3A27308280820A2E	= 741	34004	8C2080FE132080FE	= 777	34009	820F8404C7E38082	= 856
33884	813C32A0813C32A0	= 015	33313	678880808620903	= 096	34005	3A208032778085FE	= 777	34017	FE1C201F8E802018	= 780
33885	8180845A80511981	= 972	33314	63708430820A82	= 907	34006	820F8404C7E38082	= 856	34025	8210321F8E802018	= 649
33886	818080C320A0201	= 377	33315	8FEEA2009FEE1C20	= 1256	34007	3C2209551E18020315	= 970	34033	3C2209551E18020315	= 970
33887	327185C2307F8A16	= 787	33316	8FEEA2009FEE1C20	= 1256	34008	820F8404C7E38082	= 856	34041	8210321F8E802018	= 649
33888	8A80C2081680A840	= 285	33317	8FEEA2009FEE1C20	= 1256	34009	820F8404C7E38082	= 856	34049	8210321F8E802018	= 649
33889	81480A808F080540	= 285	33318	8FEEA2009FEE1C20	= 1256	34010	820F8404C7E38082	= 856	34057	8210321F8E802018	= 649
33890	665850C02702FC20	= 980	33319	8FEEA2009FEE1C20	= 1256	34011	820F8404C7E38082	= 856	34065	8210321F8E802018	= 649
33891	3208270C027092FE	= 1181	33320	8FEEA2009FEE1C20	= 1256	34012	820F8404C7E38082	= 856	34073	8210321F8E802018	= 649
33892	3208270C027092FE	= 1147	33321	8FEEA2009FEE1C20	= 1256	34013	820F8404C7E38082	= 856	34081	8210321F8E802018	= 649
33893	8A3880C027092FC20	= 628	33322	8FEEA2009FEE1C20	= 1256	34014	820F8404C7E38082	= 856	34089	8210321F8E802018	= 649
33894	20853E0132720580	= 418	33323	8FEEA2009FEE1C20	= 1256	34015	820F8404C7E38082	= 856	34097	8210321F8E802018	= 649
33895	039097F080208032	= 765	33324	8FEEA2009FEE1C20	= 1256	34016	820F8404C7E38082	= 856	34105	8210321F8E802018	= 649
33896	7085F082020A47E	= 401	33325	8FEEA2009FEE1C20	= 1256	34017	820F8404C7E38082	= 856	34113	8210321F8E802018	= 649
33897	3273803201A8027E	= 670	33326	8FEEA2009FEE1C20	= 1256	34018	820F8404C7E38082	= 856	34121	8210321F8E802018	= 649
33898	1F823240827082018	= 572	33327	8FEEA2009FEE1C20	= 1256	34019	820F8404C7E38082	= 856	34129	8210321F8E802018	= 649
33899	82327321680C32225	= 948	33328	8FEEA2009FEE1C20	= 1256	34020	820F8404C7E38082	= 856	34137	8210321F8E802018	= 649
33900	626D436685117802	= 639	33329	8FEEA2009FEE1C20	= 1256	34021	820F8404C7E38082	= 856	34145	8210321F8E802018	= 649

```

5 GO TO 0000
10 L=INT(RND(1)*S+5):REM NO. OF
MINES
20 PRINT(RND(1)*80+40):REM NO. OF
WORKERS
30 M=INT(RND(1)*50+10)*P:REM %
UNT OF MONEY
40 F=INT(RND(1)*40+80):REM PRIC
E OF FOOD
50 CE=INT(RND(1)*40+80):REM ORE
PRODUCED/MINE
60 C=B:REM GETS ORE IN STORAGE T
O ZERO
70 S=L:REM SETS SATISFACTION FAC
TOR TO ZERO
80 Y=L:REM SETS YEARS TO ZERO
90 LP=INT(RND(1)*2000+2000):REM
BUYING/SELLING PRICE FOR MINES
100 CP=INT(RND(1)*12+7):REM SELL
ING PRICE FOR ORE
110 REM CURRENT STATE AFFAIRS OF
COLONY
120 PRINT"L"
130 PRINT"YEAR",Y
140 PRINT
150 PRINT"THESE ARE":P,"WORKERS
IN THE COLONY."
160 PRINT"YOU HAVE":L,"MINES,AND
$":M
170 PRINT"SATISFACTION FACTOR IS
":S
180 PRINT
190 PRINT"YOUR MINES PRODUCED":C
E,"TONS EACH."
200 C=C+CE*L
210 PRINT"AMOUNT OF ORE IN STORE
IS":C,"TONS"
220 PRINT
230 PRINT"SELLING"
240 PRINT"="
250 PRINT"ORE SELLING PRICE IS $
":CP,"PER TON"
260 PRINT"MINING SELLING PRICE IS
$":LP,"PER MINE"
270 REM ASKS HOW MUCH ORE TO SEL
L
280 PRINT"HOW MUCH ORE DO YOU W
SH TO SELL?"
290 INPUTS
300 IF(C<0OR C>C THEN 280
310 REM TAKES AWAY SOLD ORE

```

```

320 C=C-CE
330 REM ADDS TO MONEY SUPPLY
340 M=M+P*CE*CP
345 C=B
350 REM ASKS HOW MANY MINES TO S
ELL
360 PRINT"HOW MANY MINES DO YOU
WISH TO SELL"
370 INPUTS
380 IF(L<0OR L>L THEN 370
390 REM TAKES AWAY MINE(S)
400 L=L-L:IF(L<0 THEN 390
405 L=B
410 REM ADDS TO MONEY SUPPLY
420 M=M+L*LP
430 PRINT"YOU NOW HAVE $":M
440 PRINT"BUYING"
450 PRINT"="
460 REM ASKS HOW MUCH TO SPEND O
N FOOD
470 PRINT"HOW MUCH TO SPEND ON F
OOD(APPR.$100 EA.)?"
480 INPUTF
490 REM CHECKS IF THERE'S ENOUGH
MONEY
500 IF(F<0OR F>M THEN 480
510 REM ADJUSTS MONEY SUPPLY
520 M=M-F
525 F=B
530 REM ADJUSTS SATISFACTION FAC
TOR
540 IF(F<P/120 THEN 540
550 IF(F<P/80 THEN 550
550 REM ASKS HOW MANY MINES TO B
UY
570 PRINT"HOW MANY MINES DO YOU
WISH TO BUY?"
580 INPUTS
590 IF(B<0OR B>P THEN 580
600 REM INCREASE NO. OF MINES IF
NEEDED
610 L=L+B
620 REM ADJUST MONEY SUPPLY AGAI
N
630 M=M-B*LP
645 L=B
650 REM CHECKS SATISFACTION FACT
OR
660 IF(S<0 THEN 660
670 IF(S<L THEN CE=CE+INT(RND(1)*
20+1)

```

Mineral Rites

GN Woodhead,
Wyke,
Bradford.



This is an adventure-type game. You are the leader of a mining colony in outer space and have to make decisions concerning the welfare of the planet. Full instructions are included within the program.

```

670 IF(S.9 THEN CE=CE-INT(RND(1)*2
0+1)
680 REM CHECK IF 10 WORKERS/MINE
800 IF(L<0 THEN 800
780 IF(S>1 THEN P=P+INT(RND(1)*10
+1)
710 IF(S<9 THEN P=P-INT(RND(1)*10+
1)
720 REM IF THERE IS MORE THAN 30
WORKERS
730 IF(C<0 THEN 730
740 IF(RND(1)>.01 THEN 730
750 REM RADIOACTIVE LEAK..WORKER
S HALVED
760 PRINT"RADIOACTIVE LEAK.....
...MANY DIE!"
770 P=INT(P/2)
780 IF(C<150 THEN 820
790 REM MARKET GLUT..PRICE HALVE
D
800 PRINT"MARKET GLUT.....P
RICE DROPS!"
810 CE=INT(CE/2)
820 REM ADD 1 TO YEARS
830 FOR I=1 TO 20: NEXT I
840 Y=Y+1
850 GO TO 90
880 PRINT"THE WORKERS REVOLTED!"
890 GO TO 2000
900 PRINT"YOU'VE OVERWORKED EVER
YONE!"
910 GO TO 2000
920 PRINT"YOU'VE NOT ENOUGH WORK
ERS LEFT!"
(continued on next page)

```


ed or entered. A few pokes are required before calling the routine. Poke 65089 with the number of colours required in the border. Poke 65081 with the number corresponding to the first colour, Poke 65082 with the number corresponding to the second colour, and so on.

Finally, call the routine with
RANDOMISE USR 65000

The border will remain multicoloured until a key is pressed. The addresses are summarised in Table 1.

Table 1.	65000
Start address	65080
No. of Colours	65080 Poke with a number between 2 and 6
1st colour	65081 Starting here, poke the required
2nd colour	65082 number of addresses with a number
3rd colour	65083 in the range 0-7
4th colour	65084
	0 = black 1 = blue 2 = red 3 = magenta 4 = green 5 = cyan
5th colour	65085
	6 = yellow 7 = white
6th colour	65086

Sultan's Tower

Remko Blakenburgh,
 Leiden,
 Holland.



SULTAN'S TOWER is an original, fast-moving action game which consists for the most part of machine-code. The scene is laid in Arabia in the middle ages. Fatima, the girl-friend of the Arabian prince Achmed, has been kidnapped by the wicked Sultan of Bahrain and put in his harem. She is detained on the upper floor of a tower, which consists of 10 floors.

You play the part of Achmed, who would rather keep his girl for himself. You must save Fatima but, to do so, you must reach the ninth floor starting off from the ground level. Each floor is divided into six parts which lie above each other. You must start off from the bottom part and ascend using ladders and ropes.

At the left of the upper part there is a doorway leading to the floor above you. When you have reached the upper part of the ninth floor you must grasp Fatima and run back downward. You can use slides to move down quickly. To descend to a floor below you, you should use the doorway at the left of the lower part of the floors.

When you have reached the ground level, you can leave the tower by walking through the exit at the left of the lower part and have a happy life together with Fatima. Unfortunately, it's rather difficult to save girls from harems. On every floor, harem-guards are busy chasing you. You had better beware of them because you will be sentenced to imprisonment for life if they get you.

As you progress, more harem-guards will be employed by the ugly sultan to make life hard for you. Each time you reach another floor, two more guards will try to make an end of your freedom.

Sometimes the harem-guards fall into holes. In that case, a guard can't harm you very much but after some time he will climb down

to the part below him using a rope. You can use this rope later to climb up or down.

Your time to complete your mission is limited. If you run out of time, a pretty big bomb at the bottom of the tower will explode, destroying the tower with you and your girl.

The keys used to control the game are:

1 = up/jump
 J = down
 Y = right
 T = left
 O = hold

If you are not pleased with these key controls you can change them by poking:

16830, code of key for hold
 16838, code of key up
 16845, code of key down
 16852, code of key left
 16859, code of key right

You can abandon a game by pressing Shift on its own.

The machine-code is held in one large Rem-statement with line number zero. Before entering the machine-code, you must obtain this line. To do so, enter a line

1 REM
 followed by 128 characters — that's four full lines. Then, edit this line and change the line number to 2. Continue this procedure until you have lines 1-11. Finally, enter a line

12 REM
 followed by 77 characters.

You can check whether your lines have the correct length by entering:

PRINT PEEK 16396 + 256 * PEEK 16397
 — 16509

You should get the number 1557. If not, check your lines and correct them where necessary. Now enter as direct commands, in succession:

POKE 16510,0
 POKE 16511,17
 POKE 16512,6
 POKE 16514,18
 POKE 16515,118

You now have a massive Rem-statement of

language. You will find this useful if you have an assembler and wish to incorporate it into a larger machine code program. If you want to relocate the routine, simply change the Org address. Note that the routine will only run in the top 32K of memory. Num is the variable holding the number of colours, Col is for the actual colours.

```

10000 REM ***** BORDER *****
10001 REM *****
10002 REM *****
10003 REM *****
10004 REM *****
10005 REM *****
10006 REM *****
10007 REM *****
10008 REM *****
10009 REM *****
10010 REM *****
10011 REM *****
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11196 REM *****
11197 REM *****
11198 REM *****
11199 REM *****
11200 REM *****
11201 REM *****
11202 REM *****
11203 REM *****
11204 REM *****
11205 REM *****
11206 REM *****
11207 REM *****
11208 REM *****
11209 REM *****
11210 REM *****
11211 REM *****
11212 REM *****
11213 REM *****
11214 REM *****
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11217 REM *****
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11222 REM *****
11223 REM *****
11224 REM *****
11225 REM *****
11226 REM *****
11227 REM *****
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11231 REM *****
11232 REM *****
11233 REM *****
11234 REM *****
11235 REM *****
11236 REM *****
11237 REM *****
11238 REM *****
1123
```


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Tandata Marketing Limited,
Albert Road North, Malvern, Worcs. WR14 2TL
Telephone: 06845 68421

(continued from page 108)

```

510 PLOT 4,17,"PLAYER 1
REM
520 PLOT 1,18,"
530 PLOT 20,10,"P=1
540 PLOT 2,18,"abc abc abc abc"
550 PLOT 29,18,"W"
560 IF P=1 THEN GOTO
570 PLOT 25,10,"fgh fgh fgh fgh"
580 PLOT 27,17,"PLAYER 2"
590 POKE C260,7:PRINT
600 IF P=2 THEN PRINT:GOTO 420
610 PRINT SPC(11);CHR$(27);"AWI SCORE =
"AI
620 PRINT
630 PRINT:PRINT:PRINT
640 REM >> BUBBLE <<
650 PLOT 2,12,"
660 PLOT 1,12,"
670 PLOT 2,12,"abc"
680 PLOT 22,12,"fgh"
690 FOR Y=0 TO 51
700 PLOT Y,12,"
710 NEXT Y
720 BL=INT(RND*(11+9))+17
730 A=INT(127/2)-1
740 PLOT 4+X,12,"
750 FOR Y=0 TO 4+BL-X
760 PLOT Y,12,"a"
770 NEXT Y
780 PLOT 22,14,STR$(BL)
790 PLOT 22,14,"fgh+0"
800 REM >> GAME BEGINS <<
810 IF SPC(11)GOTO 1200 THEN 1120
820 POKE C260,21:PRINT
830 PRINT"PLAYER 1":PRINT
840 PLOT 24,25,"
850 PRINT"NOW MANY SHOTS (1-3) ?"
860 A=KEY$+KEY$+KEY$
870 GET A$(A=VAL(A))
880 IF A/3 OR A/3 THEN B=5
890 PRINT A$
900 A=0-1:X=0
910 GOTO 930
920 PLOT X,12,"
930 P=1
940 IF SPC(11)=1200 THEN 950
950 IF SPC(11)=1200 THEN 1010
960 PLOT X,12,"a"
970 GOTO 990
980 SHOOT:BL=BL-1
990 PLOT X,12,"a"
1000 PLOT 25,14,"
1010 PLOT 22,14,STR$(BL)
1020 PLOT 22,14,"
1030 IF A=0 THEN 1120
1040 WAIT 20
1050 GOTO 980
1060 GOTO 1000
1070 GOSUB 1520
1080 IF P=2 THEN 1090
1090 S=0
1100 PLOT 20,10,STR$(S)
1110 PLOT 20,10,"
1120 T1=T2-1
1130 IF P=1 THEN 1210
1140 REM >> PLAYER 2 <<
1150 PRINT"PLAYER 2":PRINT
1160 PLOT 24,25,"
1170 PRINT"NOW MANY SHOTS (1-3) ?"
1180 A=KEY$+KEY$+KEY$
1190 GET A$(A=VAL(A))
1200 IF A/3 OR A/3 THEN 1075
1210 PRINT A$GOTO 1290
1220 REM >> COMPUTER <<
1230 PRINT"ORIG : ";PRINT
1240 A=INT(RND*(11+9))+17
1250 IF BL-X+4=INT(BL/4)+1 THEN 1290
1260 A=(BL+1)/4-INT(BL/4)+4
1270 PRINT"1 :";BL;"2 :";A;"SHOTS
"
1280 WAIT 50
1290 A=0-1:X=0
1300 GOTO 1320
1310 PLOT X,12,"
1320 P=1
1330 IF SPC(11)=1200 THEN 1370
1340 IF SPC(11)=1200 THEN 1420
1350 PLOT X,12,"a"
1360 GOTO 1310
1370 SHOOT:BL=BL-1
1380 PLOT X,12,"a"
1390 PLOT 25,14,"
1400 PLOT 22,14,STR$(BL)
1410 PLOT 22,14,"
1420 IF A=0 THEN 1370
1430 WAIT 20
1440 GOTO 1370
1450 GOSUB 1500
1460 T1=T2-1
1470 IF P=2 THEN 1490
1480 REM >> HIT <<
1490 A=2:PLOT 1,12,"
1500 GOTO 1530
1510 GOTO 1530
1520 A=2
1530 PLOT X,12,"1"
1540 EXPLODE
1550 WAIT 30
1560 PLOT X,12,"1k1"
1570 EXPLODE
1580 WAIT 50
1590 PLOT X,12,"min"
1600 WAIT 300:RETURN
1610 REM >> NAME OVER <<
1620 PLOT 1,9,"PLOT 1,10,1
1630 PLOT 2,9,"PLOT 2,10,14
1640 PLOT 11,9,"O A M E O V E R"
1650 PLOT 11,10,"O A M E O V E R"
1660 IF S=1 THEN END
1670 WAIT 1000:GOTO 200
1680 POKE C260,21:PRINT
1690 PRINT"HELL SOME PLAYER "S"WIN"
1700 PRINT"YOU HAVE WON BY "T1"1"TAKE
"
1710 WAIT 1000:GOTO 250

```

Header reader

H.V. Smith,
Brecon,
Powys.

Amstrad

I HAVE WRITTEN a program similar to ones published previously for other computers e.g. the ZX Spectrum or the Amstrad CPC-464. It is a program written in Basic with a short accompanying ZX-machine-code routine which reads the header at the beginning of a file on tape and interprets this to give the user the information recorded there, which is normally inaccessible to the user.

On running, the program first returns the screen display to its default conditions as at startup when switching on. This is achieved by the two calls to the firmware jumplock: Call &BBFF and Call &BB4E. Using these two simple calls avoids having to reset all the separate aspects of the screen display i.e. the Mode, Pen, Paper, Ink settings etc. These two calls are in fact quite useful in any program at the beginning to make sure that the effect of printing on the screen can be entirely predictable.

It then calls the subroutine at line 230 and onwards which simply pokes in the short machine code routine at 41000 onwards. It also lowers Himem to 39999 to give space for the routine and for the storage of the data obtained from the header, the amount of space allocated being in fact more than adequate, though this fact is unlikely to mean that there is insufficient memory left for use by any program residing in memory, mainly because it is unlikely that any program other than the header reader would be in the memory.

The program then calls the machine code routine which starts the tape and searches for the header at the beginning of a file. Since the routine uses quite a low level Rom routine

```

10 REM *****
20 REM ** (c) Howard V. Smith 1985 **
30 REM *****
40 CALL &BBFF:CALL &BB4E
50 GOSUB 230
60 POKE 40030,0:CALL 41000:IF PEEK(40030)=253 THEN PRI
NT"Escape pressed...":PRINT:GOTO 210 ELSE IF PEEK(4003
0)<0 THEN PRINT"Tap Er
ror":PRINT:GOTO 210
70 PRINT SPACE$(7);"Tape Header Reader :";PRINT CHR$(2
1);CHR$(1);CHR$(1);SPACE$(7);STR$(10,"_");CHR$(22)
);CHR$(0)
80 PRINT:PRINT:PRINT"Filename : ";t=0:FOR a=40020 TO
40015:PRINT CHR$(PEEK(a));t=t+PEEK(a):NEXT a:IF t=0 THE
N PRINT"Unnamed File";
90 PRINT:PRINT:PRINT"Block Number :";PEEK(40016)
100 PRINT:PRINT:PRINT"Last Block ? :";IF PEEK(40017)=0 THE
N PRINT"No."ELSE PRINT"Yes."
110 PRINT:PRINT:PRINT"File Type : ";a=PEEK(40018)
120 a=BIN$(a,8)
130 t=VAL(MID$(a,5,3)):IF t=0 THEN PRINT"BASIC Progra
m"ELSE IF t=1 THEN PRINT"Binary File"ELSE IF t=2 THEN
PRINT"Screen Image"ELSE
IF t=3 THEN PRINT"ASCII File"ELSE PRINT"Unknown."
140 PRINT:PRINT:PRINT"Protected ? : ";IF VAL(RIGHT$(a,1))=
1 THEN PRINT"Yes."ELSE PRINT"No."
150 PRINT:PRINT:PRINT"Length Of Data In Block :";PEEK(40019)
+256*PEEK(40020);"Bytes"
160 PRINT:PRINT:PRINT"Address From Which Written :";PEEK(400
21)+256*PEEK(40022)
170 PRINT:PRINT:PRINT"First Block ? : ";IF PEEK(40023)=0 TH
EN PRINT"No."ELSE PRINT"Yes."
180 PRINT:PRINT:PRINT"Total Length Of File :";PEEK(40024)+25
6*PEEK(40025);"Bytes"
190 PRINT:PRINT:PRINT"Entry Address : ";a=PEEK(40026)+256*P
EEK(40027):IF a THEN PRINT a ELSE PRINT"N/A"
200 LOCATE 1,25
210 PRINT"Continue...?";k="":WHILE k=""&&INKEY#&:WE
ND:CLS:IF LOWER$(k)<>"n"THEN 60
220 END

```

(continued on facing page)

which does not give the user a prompt to press Play on the tape recorder, it is a good idea to the cassette installed in the datacard and to have Play depressed before running the program though this is not essential. The actual machine code routine is as follows:

Hex. 3E 2C	Mnemonic LA A, &2C	Comments. ; loads the parameters
21 40 8C	LD HL, &9C40	; for the routine into
11 40 00	LD DE, &0040	; A, HL, and DE.
CD A1 BC	CALL &BCA1	; calls the Rom routine
D8	RET C	; returns to Basic if OK
C6 FD	ADD A,&FD	; generates an error byte
32 5E 9C	LD (&9C5E),A	; which is placed in &9C5E
C9	RET	; returns to Basic

The Basic program then checks by Peeking location 40030 whether the routine called has been successful or whether an error has occurred. It also checks whether the user hit the Escape key during the Rom routine which halts its action, and acts accordingly.

If the routine is run correctly then the pro-

gram interprets the data stored at locations 40000 to 40063. In fact only the locations from 40000 to 40027 contain useful information, although the bytes in the header stored from 4028 to 40063 can contain useful information when the file is not created by Basic tape commands. In any case, whatever information this may be, it cannot be interpreted in terms such as block number or similar in the same way as the other bytes. Indeed, the information stored here is likely to have a unique purpose for every program in which they are used at all.

The program displays the information under the headings Filename, Block Number, File type, Length of Data in Block, Address from which the file was written, Total length of file, the Entry Address in the case of machine code programs, and also says whether the block being read is the first or the last block or not and whether or not the program is protected.

Once the information has been displayed,

```

230 REM Machine code
240 MEMORY 39999
250 DATA 3e,2c,21,40,9c,11,40,0,cd,a1,bc,d8,c6,fd,32,5
e,9c,c9
260 FOR a=41000 TO 41017:READ b:#POKE a,VAL("&b#")LINE
XT
270 RETURN
    
```

Spectrum tape back-up.

Idea by J.Evans

```

1 REM Code by D.Branks
10 FOR n=USR "a" TO USR "a"+8
20 READ a: POKE n,a: NEXT n
30 DATA 243,14,254,237,120,237,121,24,250
40 RANDOMIZE USR USR "a"
    
```

Teeth Eater

Paul Kinnaird,
Belfast.

VW-20

THIS GAME is for the unexpended Vic-20. It loads in two parts. Part 1 pokes the graphics into the memory, prints up the name of the game, Teeth Eater, and automatically loads the main game — part 2 — using a short

machine-code routine.

You are a toothpaste tube and you must stop the bacteria from eating away at the teeth. You may move left and right by using the keys Z and X, and you may shoot using the spacebar. You have one minute to hit as many bacteria as possible. For each bacteria you hit you get 100 points. A high score is kept and displayed at the end of each game. If the bacteria gets to the toothpaste tube you will be contaminated and the game will be over.

```

280 FOR=0 TO 99:READ A:POKE 168+T,
4: NEXT
300 DATA 254,254,254,254,254,254,
254,254
310 DATA 127,127,127,127,127,127,
127,127
320 DATA 81,60,127,255,255,255,255,
5,255
330 DATA 248,248,252,254,254,254,
254,254
340 DATA 255,255,255,255,255,255,
255,255
350 DATA 255,255,255,255,255,255,127,
53,31
360 DATA 254,254,254,254,254,255,
249,248
370 DATA 255,126,126,126,94,94,94,
94
380 DATA 94,94,94,94,126,68,24,24
390 DATA 126,219,255,255,197,126,
26,192
400 DATA 24,0,24,0,24,60,60,24
    
```

```

410 DATA 147,82,0,0,214,0,82,147
500 POKE 36879,5: PRINT " "
510 PRINT " "
520 GOTO 540
530 PRINT " "
540 PRINT " "
550 POKE 820,169:POKE 829,2:POKE 83,
0,141:POKE 831,190:POKE 832,0:POKE
833,169:POKE 834,131
560 POKE 837,141:POKE 836,115:POKE
837,2:POKE 838,169:POKE 839,13:POKE
840,141:POKE 841,128
570 POKE 842,2:POKE 843,96
580 SYS 1625
    
```

```

10 PRINT " " :POKE 36879,29
20 PRINT " " :TYPE IN "SPEED"
30 PRINT " " :FASTEST=10: SLOWEST
    
```

the program pauses and asks whether the user wishes to continue to read another header. Any key other than n is taken to mean yes, while if n is pressed, the program ends. Otherwise, the program repeats the process, searching for another header. The time between when the Continue . . . message is displayed and when a key is pressed is a good time to change tapes, fast forward etc.

It would also probably be convenient, if the user owns a printer to change the appropriate Print statements to Print 8 statements to obtain a hard copy of the header information for later use.

I should be most happy to answer reader's inquiries about the program should any arise providing that the inquirer encloses an sae with any questions sent to me. I also am willing to provide a tape copy of this program to any reader if they send a blank tape and a cheque/PO for £1.00 inclusive of p&p to H.V. Smith, Upper Dunsparc, Llandefalle, Brecon, Powys LD3 0UN.

Tape back-up

David Branks,
Thornbury,
Bristol.



I HAVE CREATED the ultimate tape back-up program for the ZX Spectrum. It is very reliable and can copy any program. It can even copy music. It can back-up any length program — 1000000K+ — and only takes up nine bytes.

It works by taking in a signal from the mic and putting it out the ear to another tape recorder. The only disadvantage of this system is that you have to pull the plug upon finishing. Note that the border doesn't change colour.

```

10 PRINT " "
20 INPUT S
30 IF S=CORV$10 THEN 18
40 V$=V$+20
50 H$=0
60 FOR T=168+32*0 TO 168+32*8: P
OKE T,0: NEXT
70 POKE 36869,248
100 S1=36874: S2=36875: S3=36876: S
4=36877: V=36878
110 S=7790: H=7512: S1=38710: H1=38
532: S=8852: H1=38772: S=C=0
180 POKE 36879,5: PRINT " "
200 START GAME PRESS " "
210 PRINT " "
220 PRINT " "
230 PRINT " "
240 GETAS: IFAS=" " THEN 140
250 IFAS=" " THEN 170
260 GOTO 140
270 POKE V,15
275 GOSUB 8000
280 FOR T=14870254:POKE S1,T:POKE
S,1:POKE S,T: NEXT
(continued on next page)
    
```


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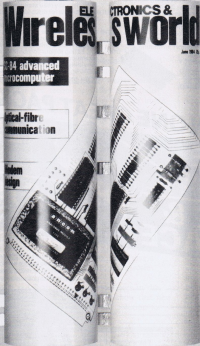


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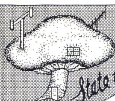
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Above... I have taken a piece of hires screen, and by using a simple FOR-NEXT loop, have dumped it here using each of the modes available on my printer. I even have a choice of 4 ROTATIONS! (The 4th can be for shading). The rotation can be used in both low and hi-res and, can be either a whole screen or just one character square. There are over 20 commands, and 255 secondary addresses, giving the user plenty of freedom to make his printer perform whatever tricks it was designed to, and perhaps a few the makers hadn't thought about. The writer has even made some amendments to the operating system of the 64, just to make life a little easier. You can print... "CENTIPEDE" Control codes" or maybe... "CENTIPEDE" Control codes" Or if you're just not in the mood for opening and closing files, then you can use the "H" command which does it all for you! Generally, the use of 64 codes has been cut to the minimum so you may enjoy using your printer to the maximum. Of course, you can still use this utility as though the extra features didn't exist. We don't want to change tradition... too much. Whichever way you want to use your printer, you'll find the way with 'CENTIPEDE'.

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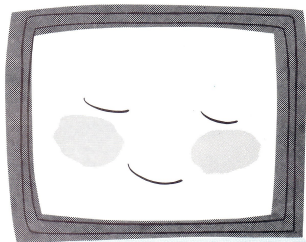
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